

THE IRON AGE

A Review of the Hardware, Iron and Metal Trades.

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Reading Matter Contents page 1094
Classified List of Advertisers.... " 91
Alphabetical Index to Advertisers " 95
Advertising and Subscription Rates " 1113



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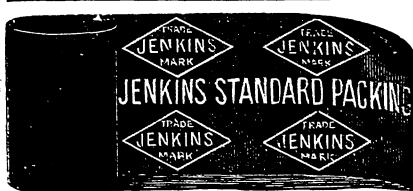
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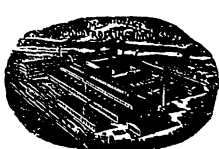
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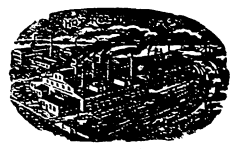


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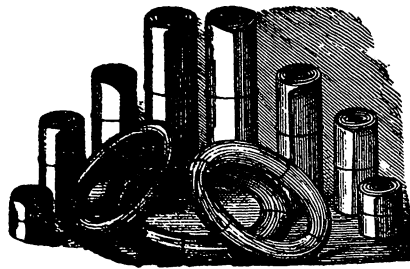
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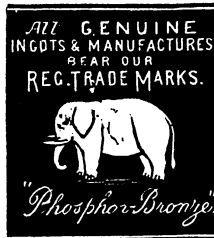
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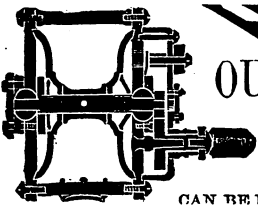
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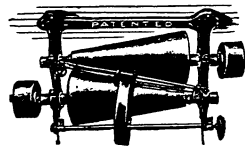
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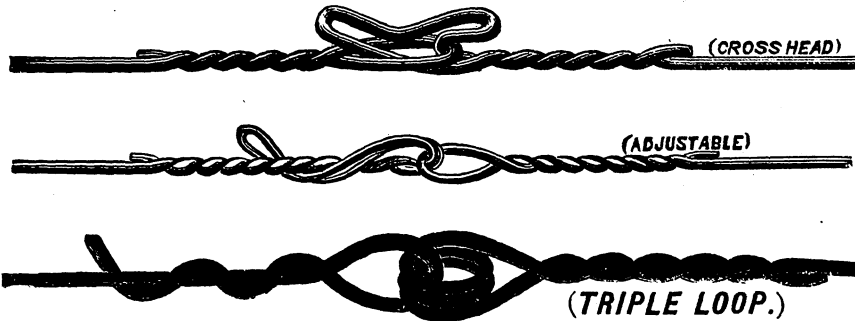
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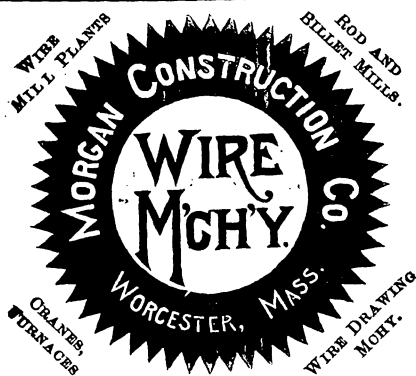


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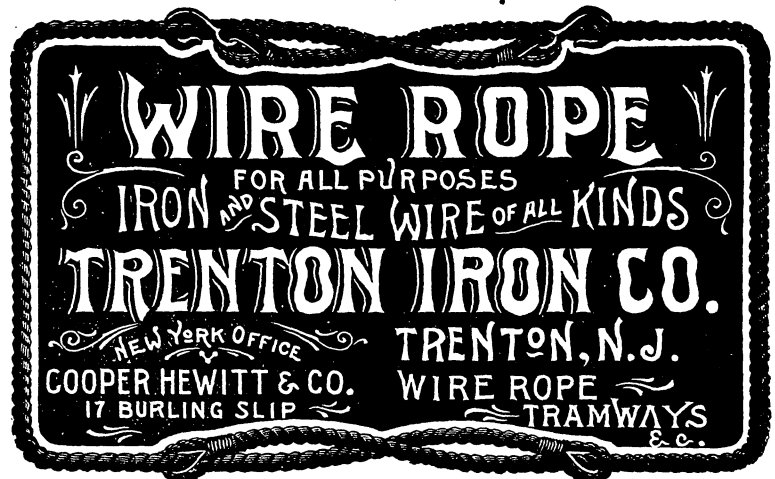
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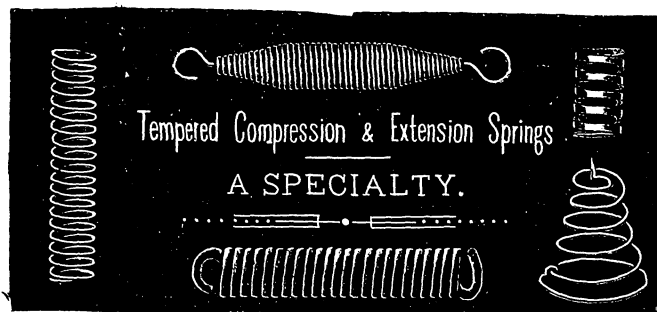


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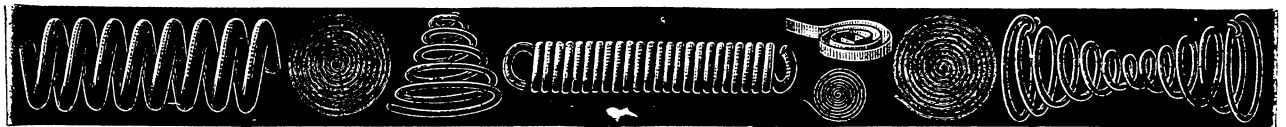
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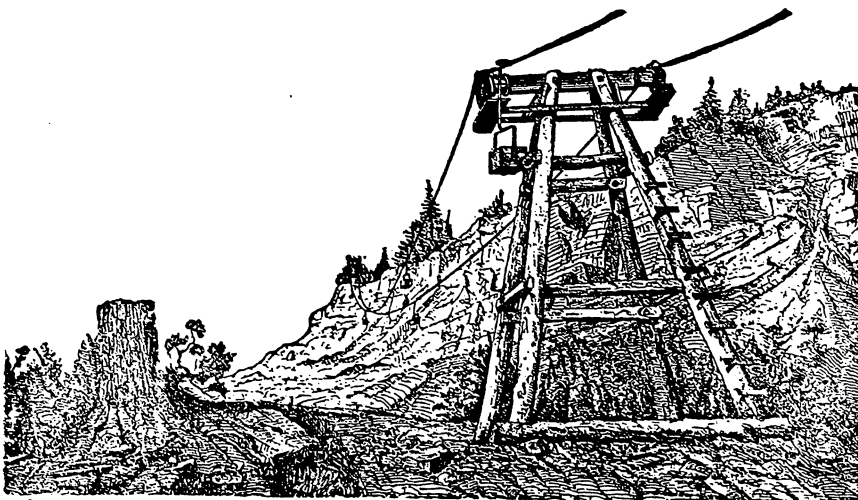
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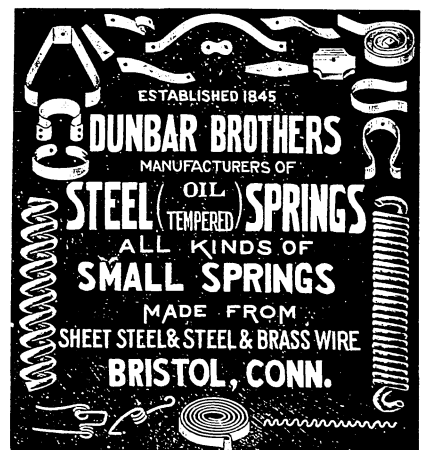
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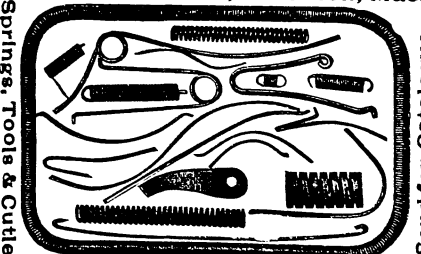
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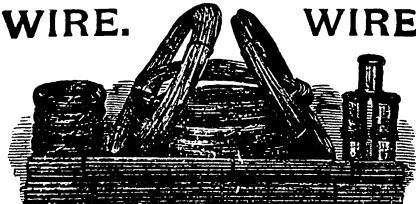
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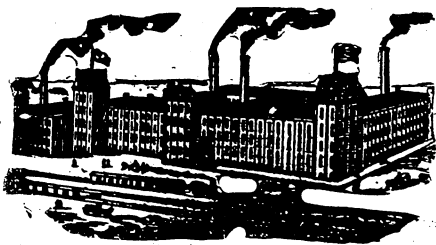
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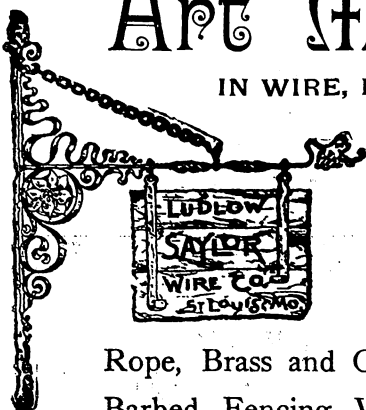
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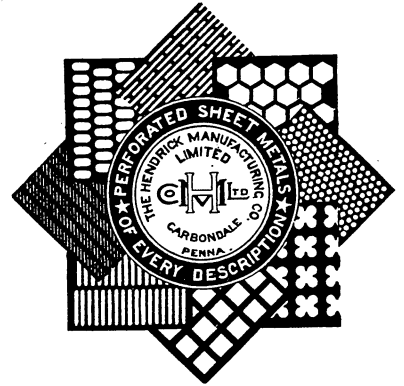


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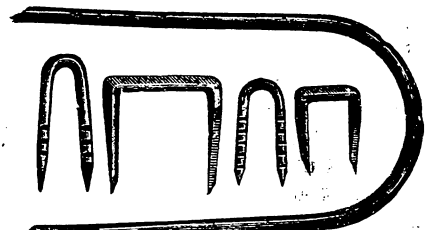
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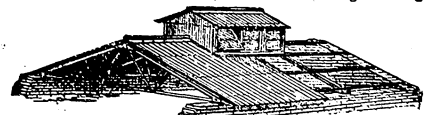
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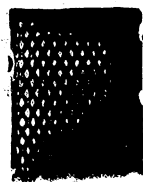


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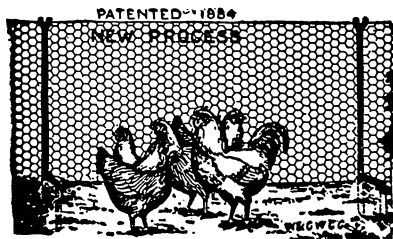
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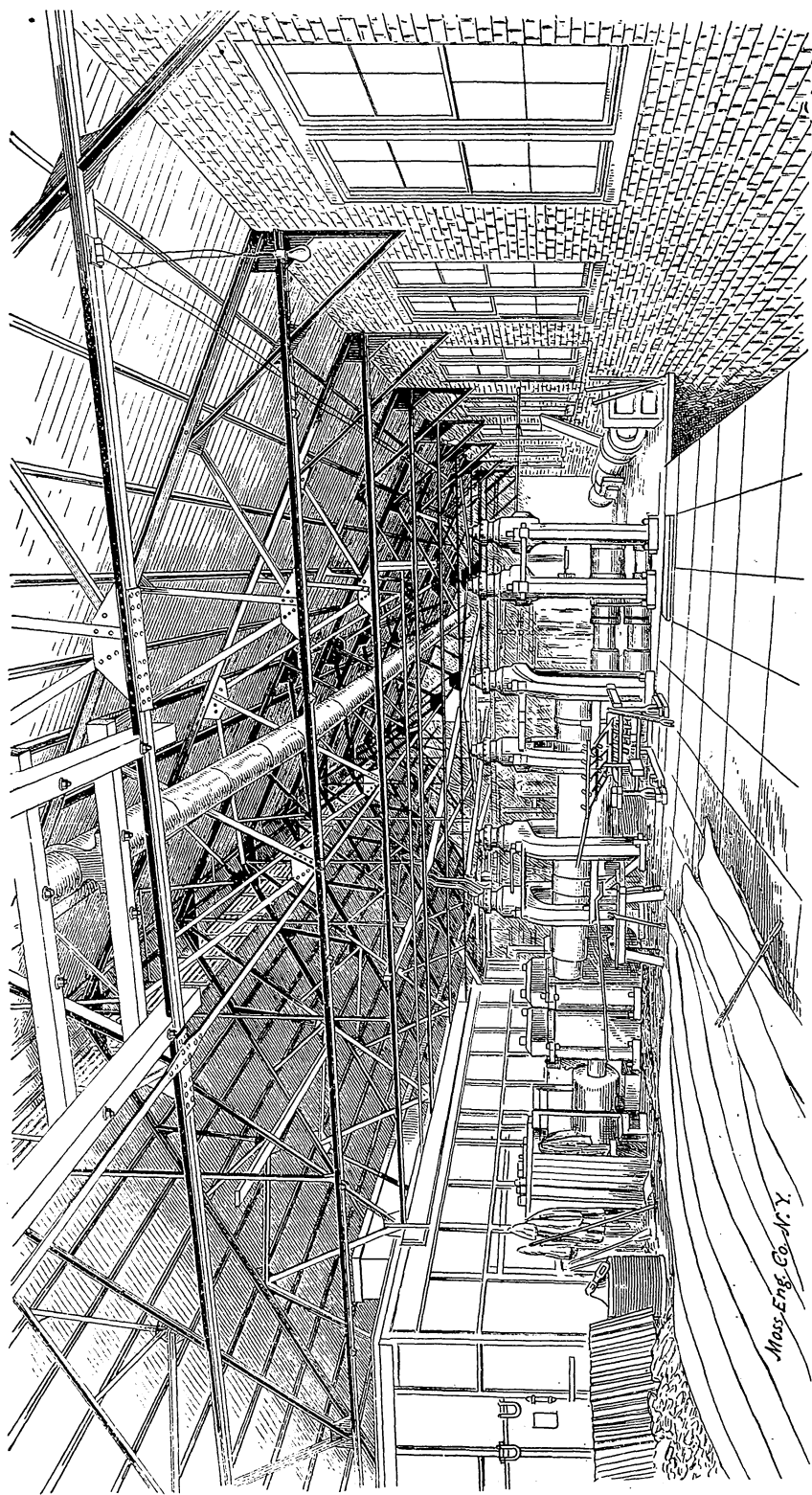
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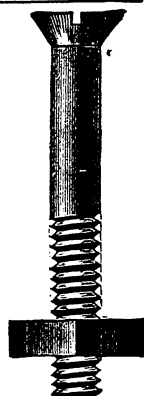
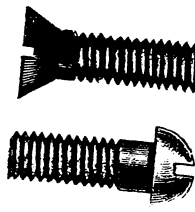
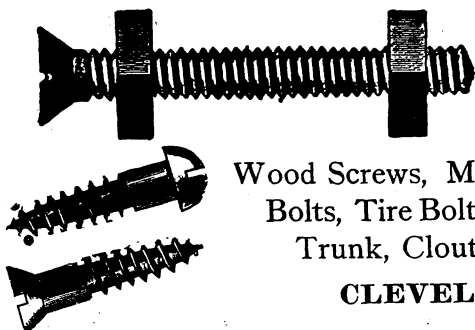
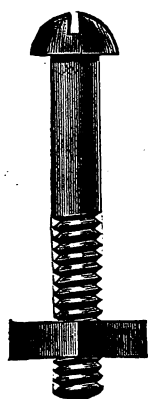
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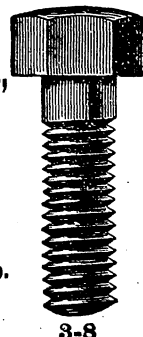
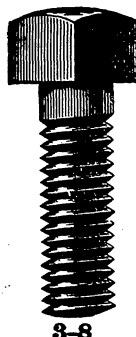
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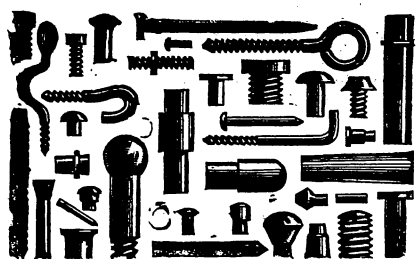
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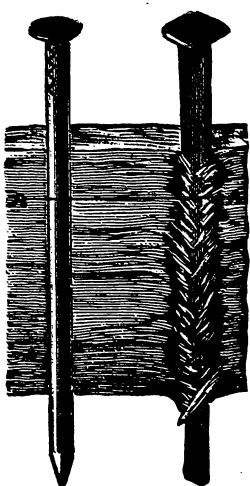
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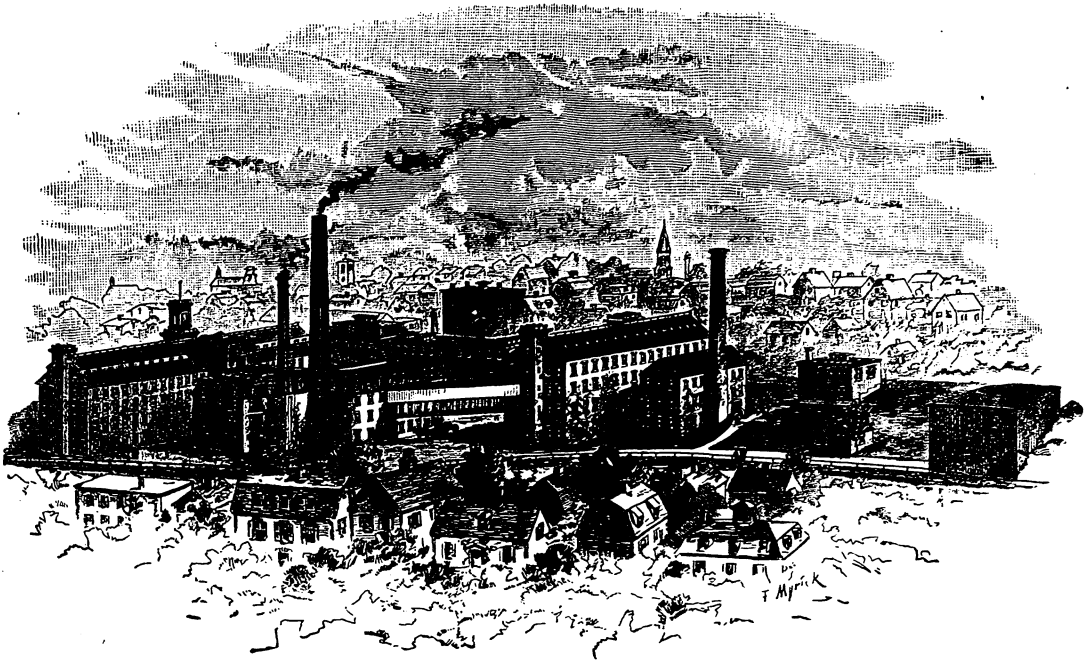
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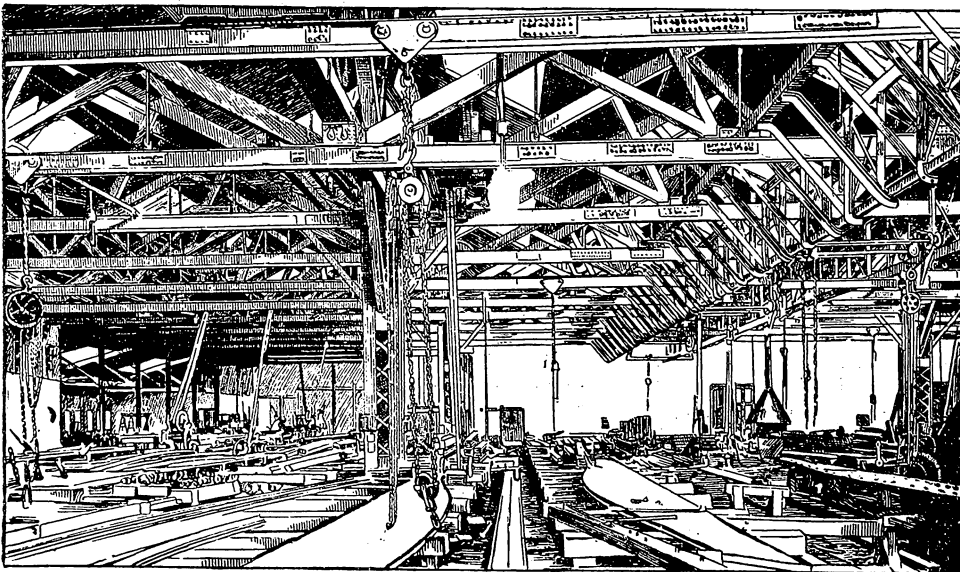
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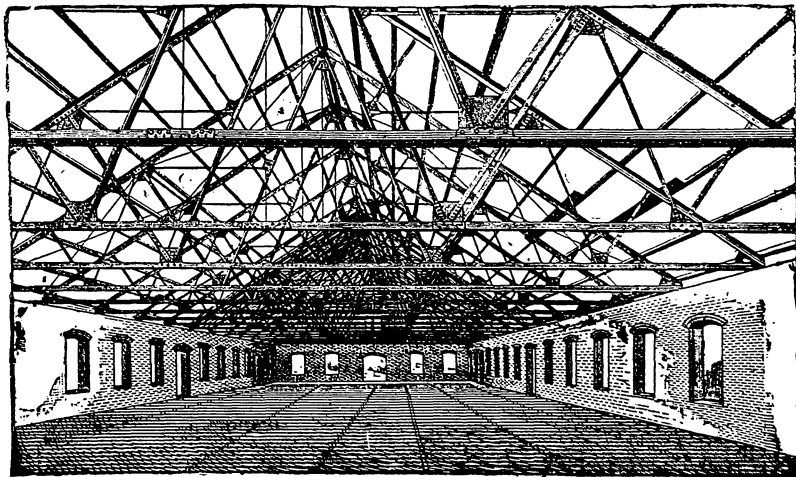
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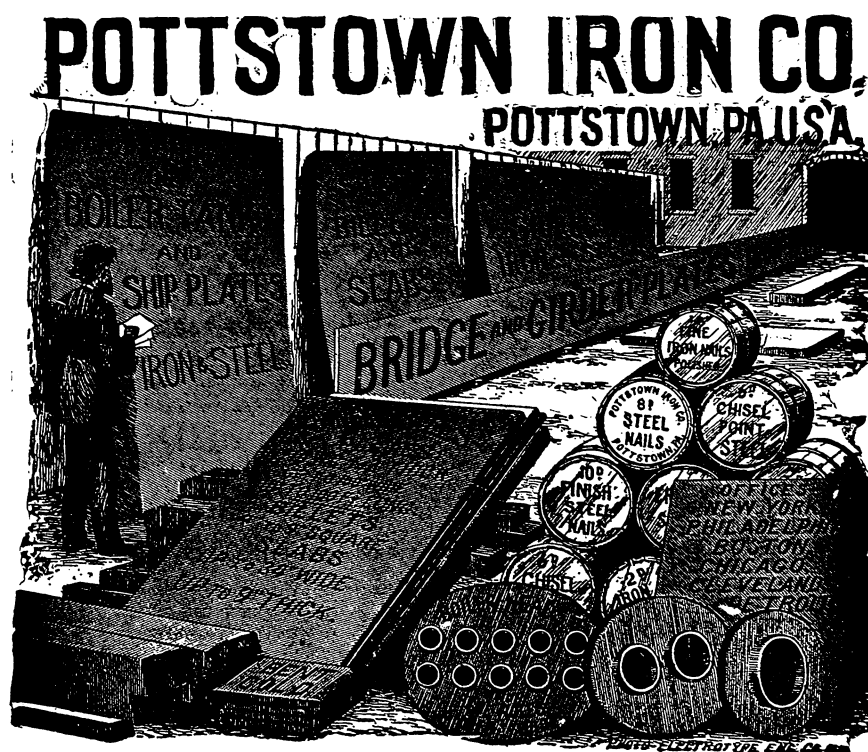
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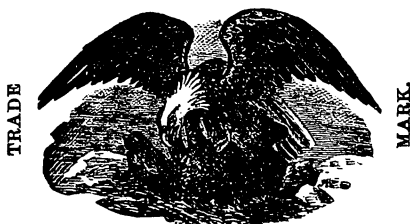
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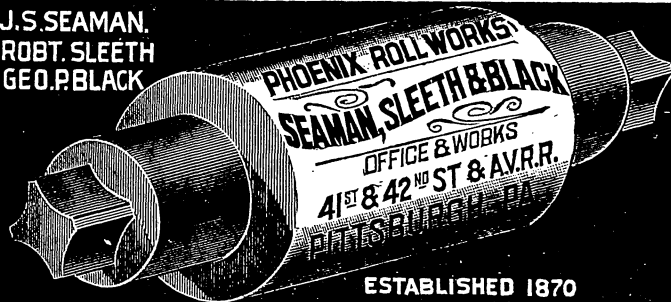
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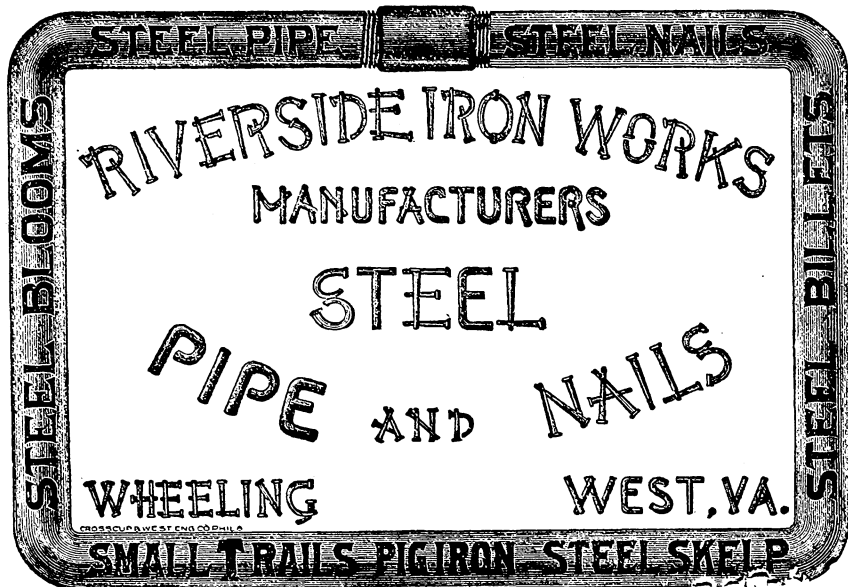
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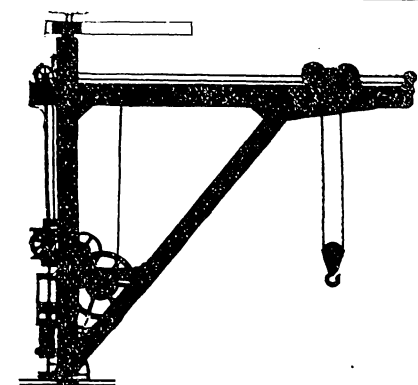
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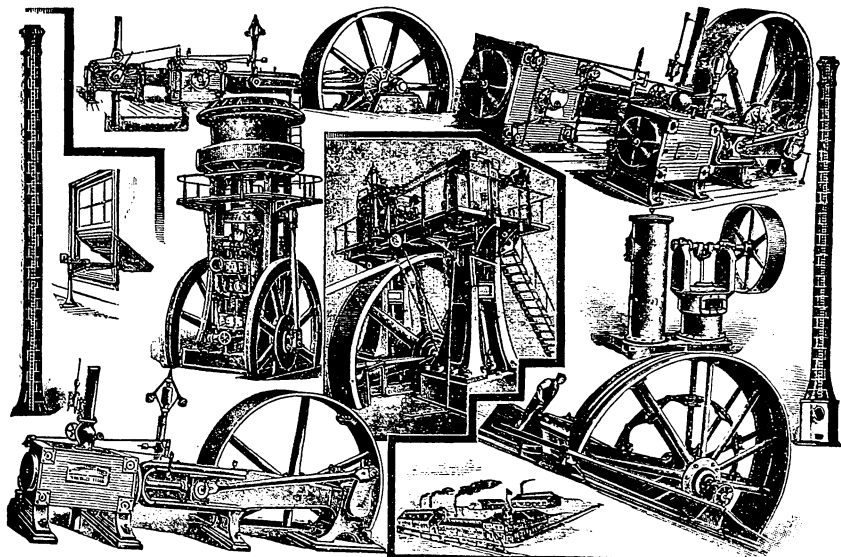
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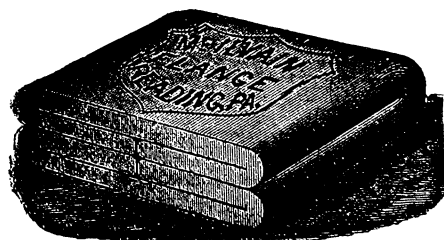
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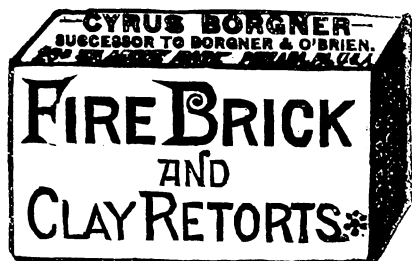
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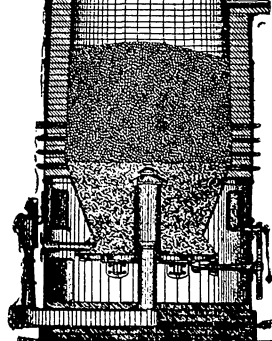
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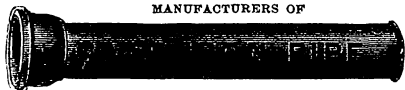
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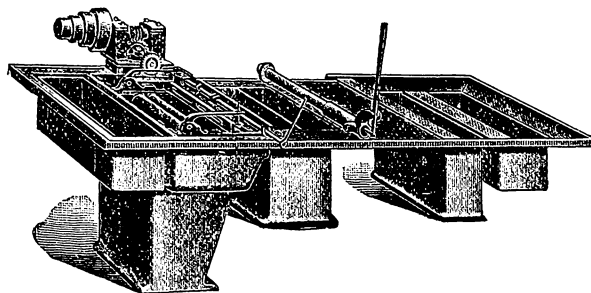
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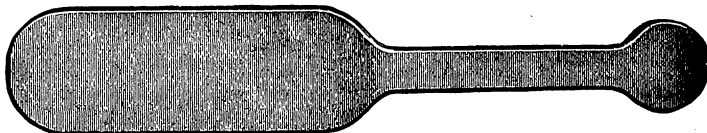
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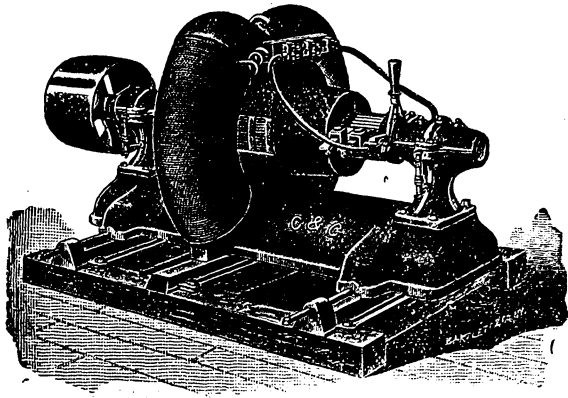
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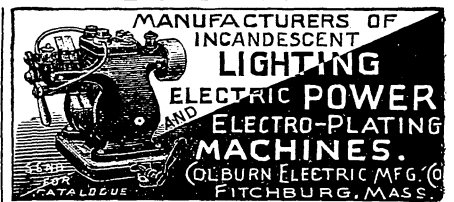
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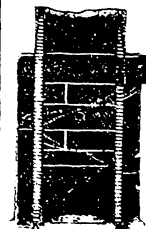
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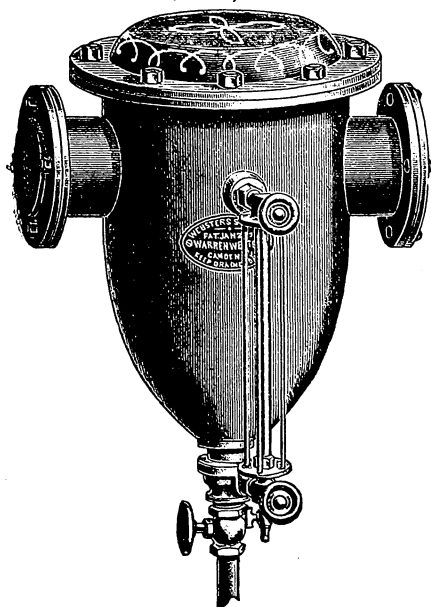
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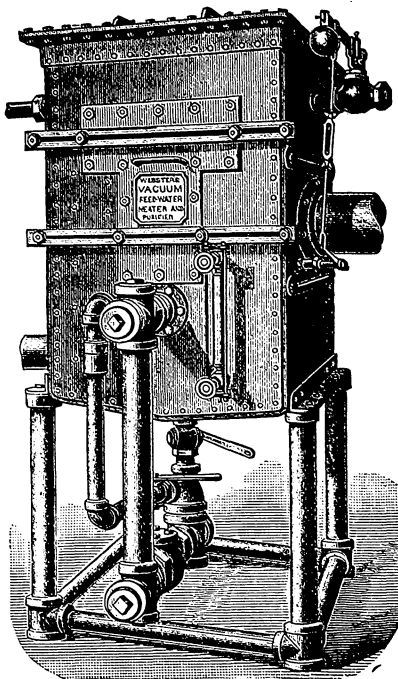
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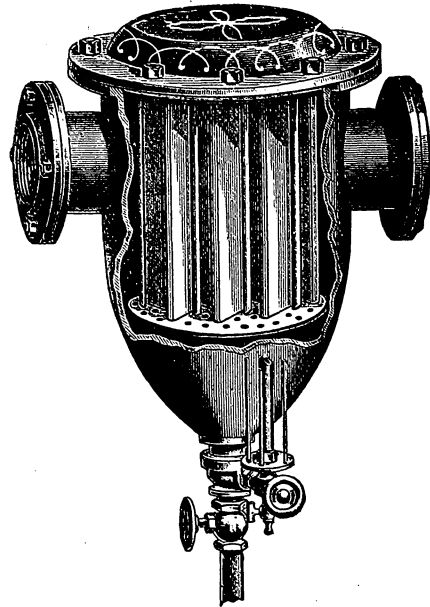
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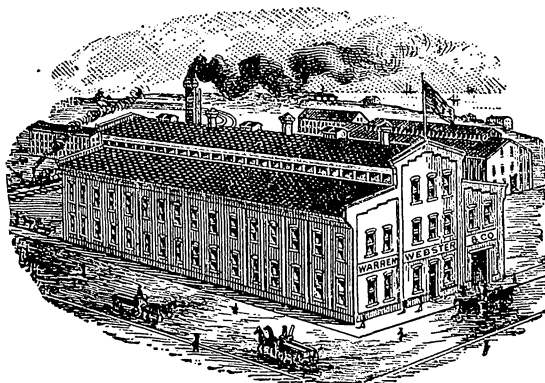
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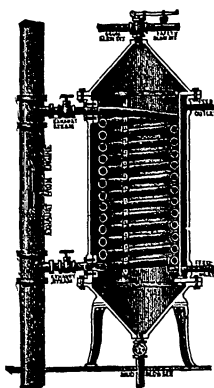
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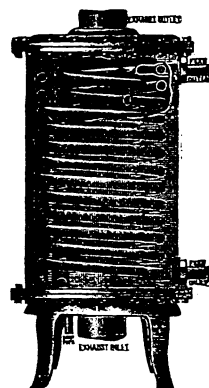
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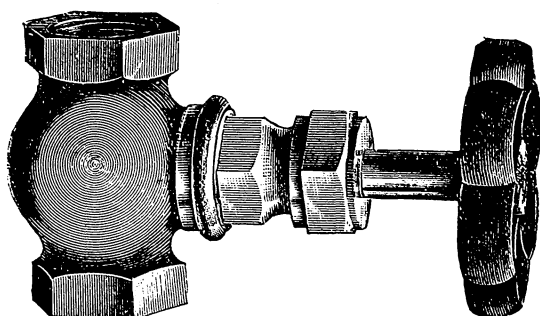
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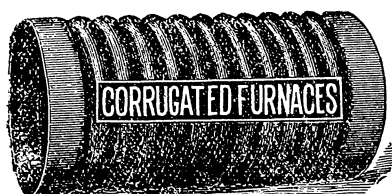
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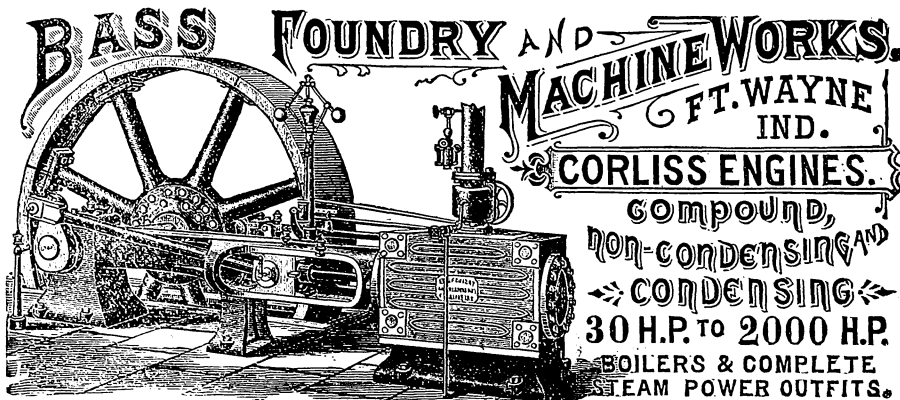
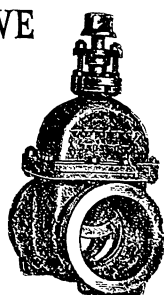
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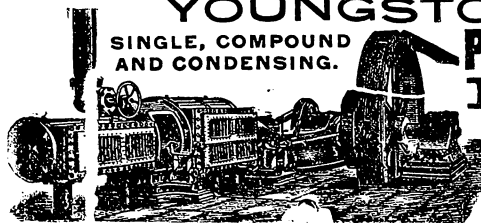
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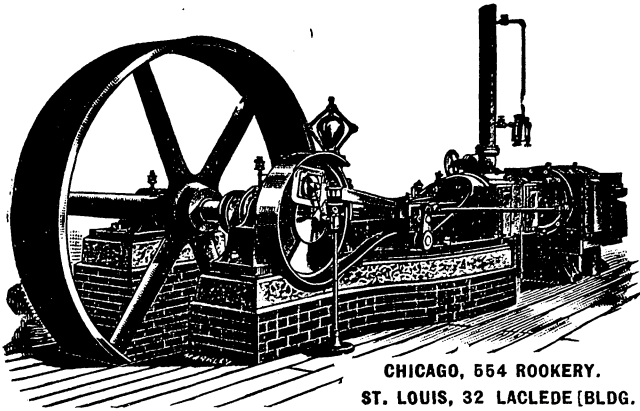
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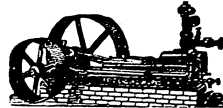
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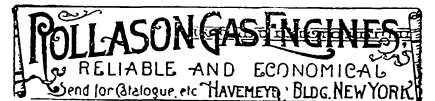
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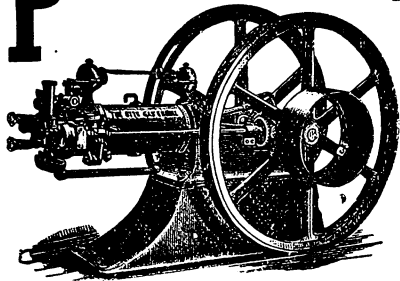
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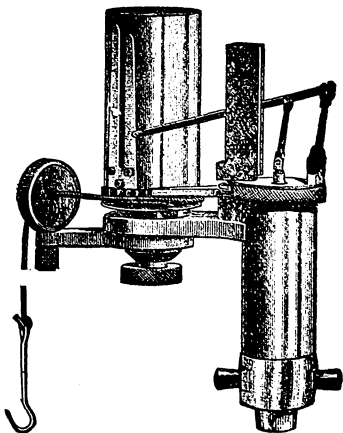
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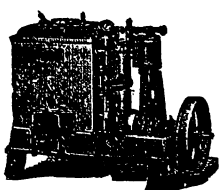
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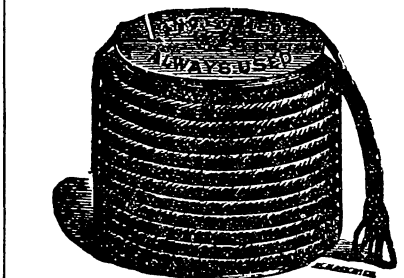
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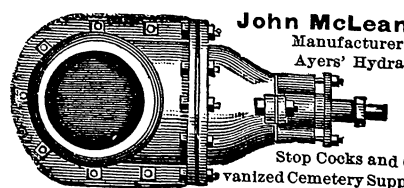
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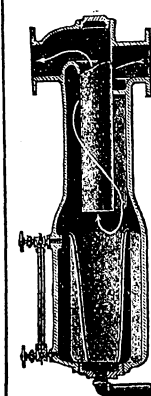
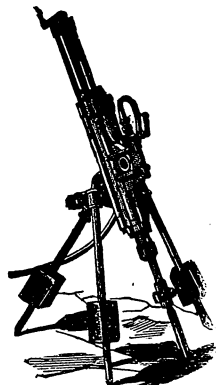
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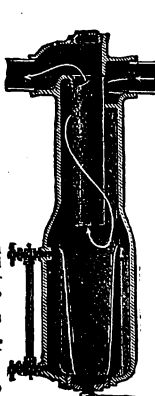
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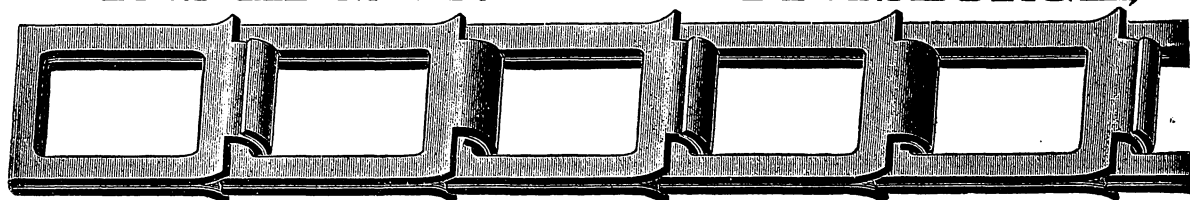
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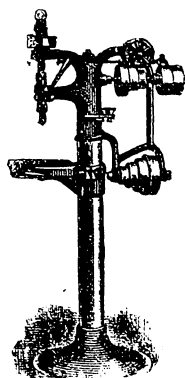
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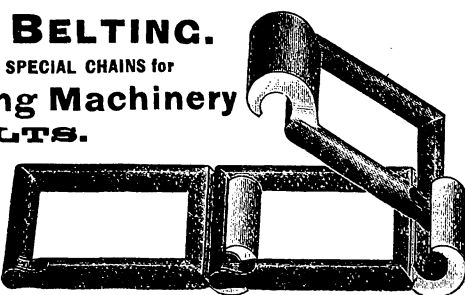
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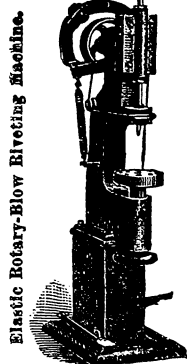
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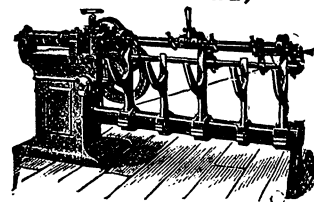
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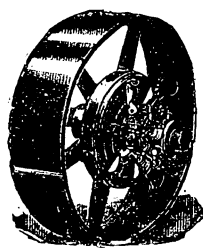
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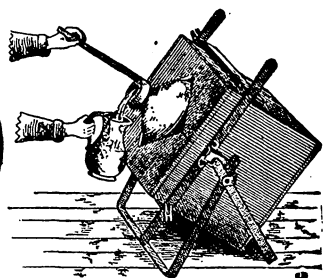
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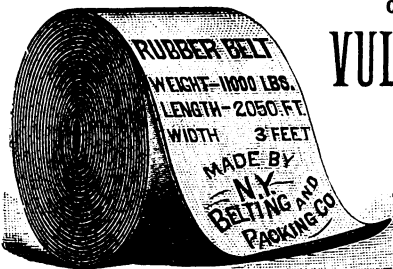
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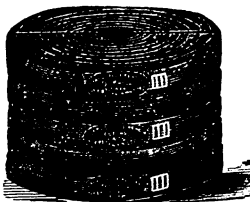
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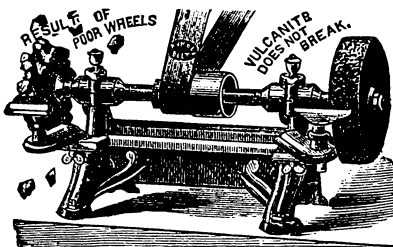
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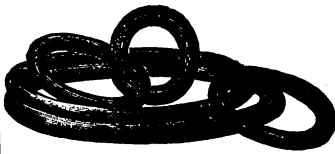
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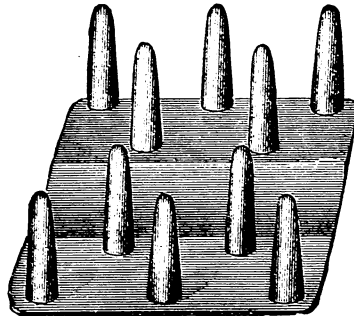
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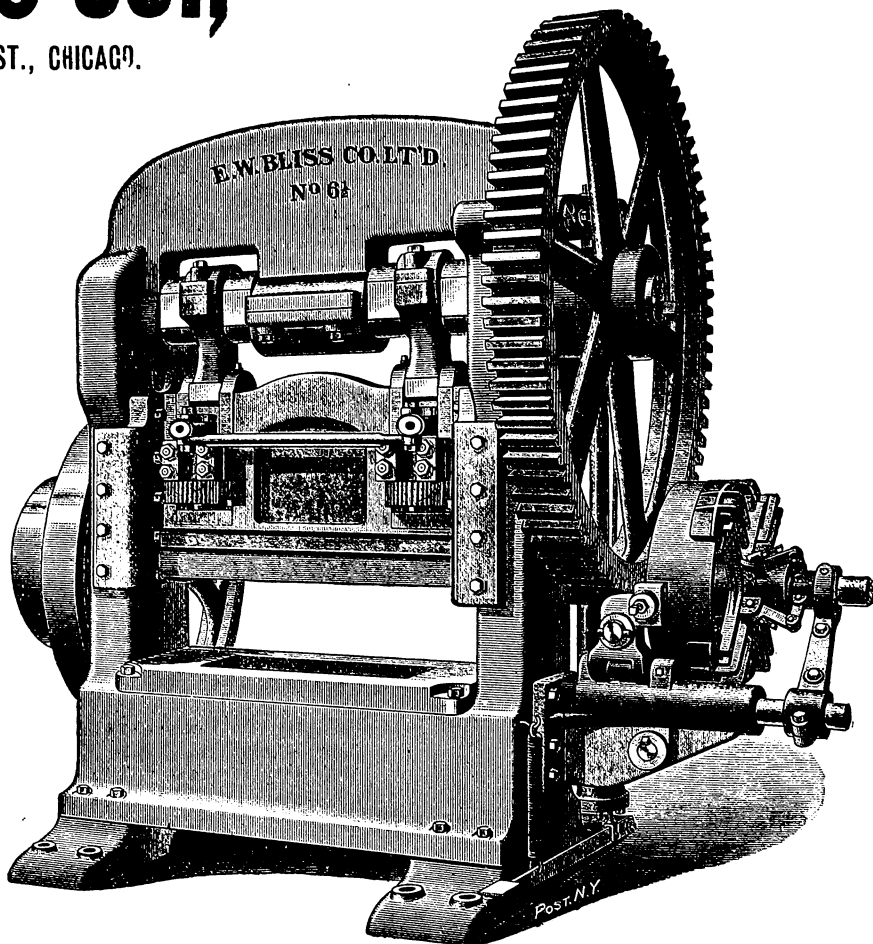
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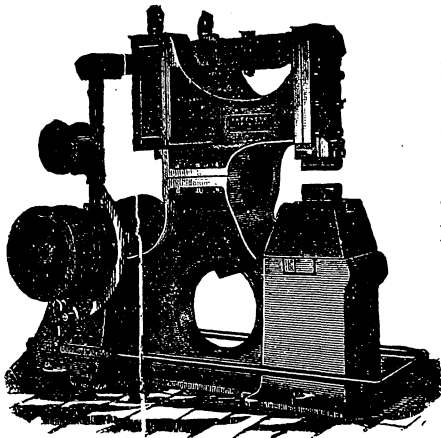
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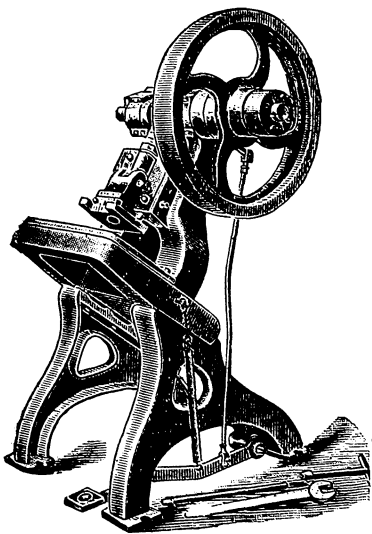
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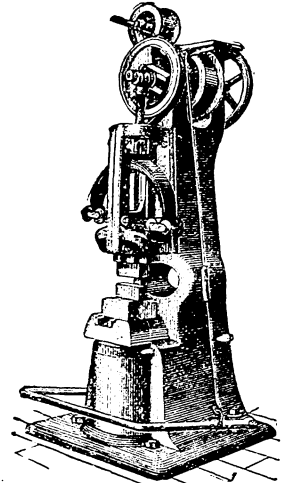
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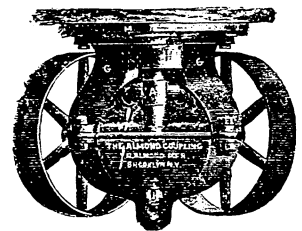
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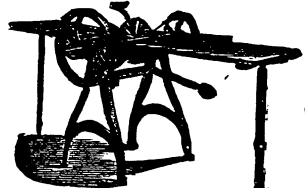
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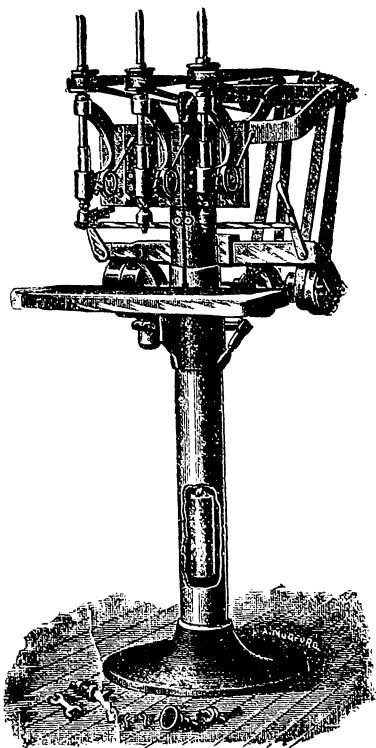
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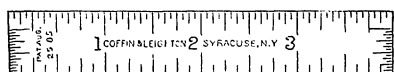
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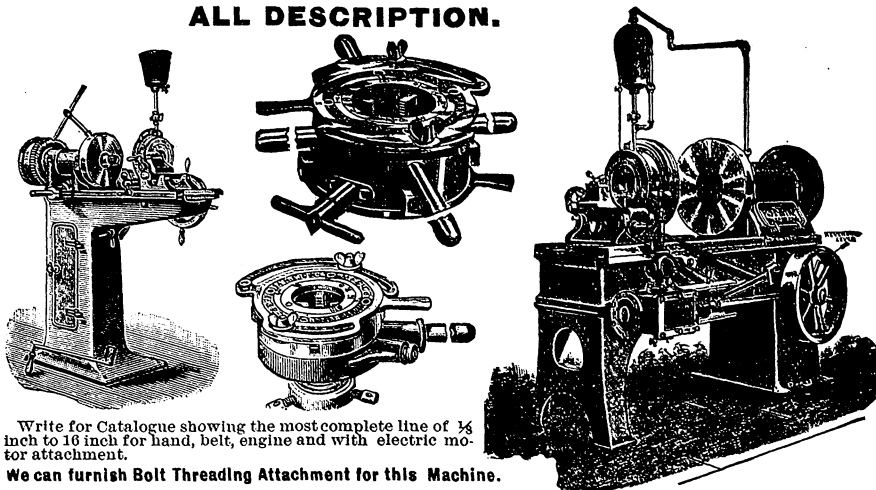
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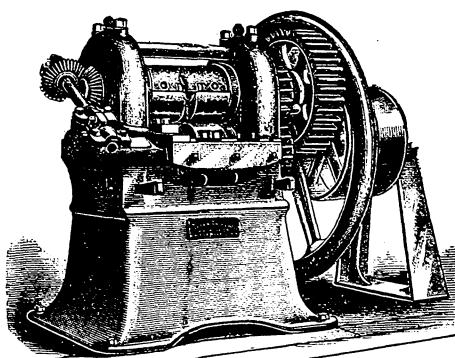
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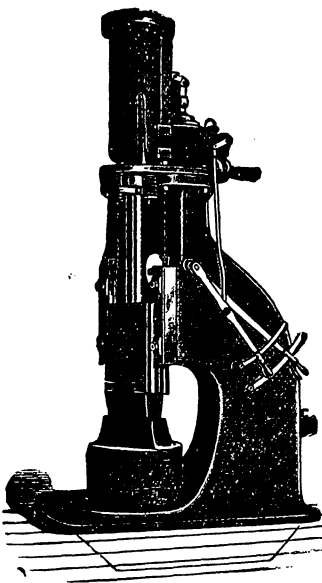
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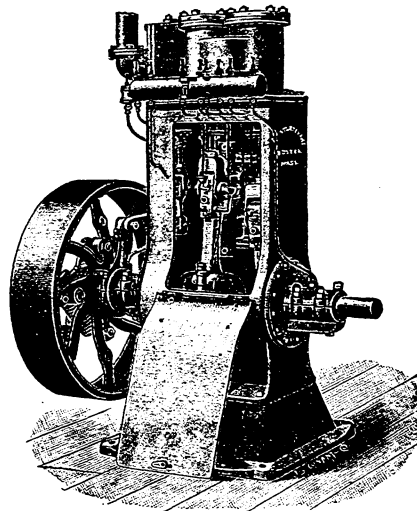
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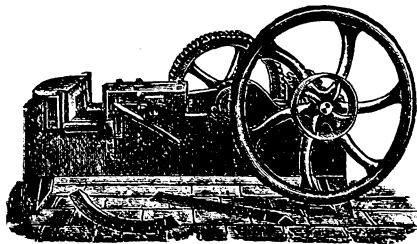
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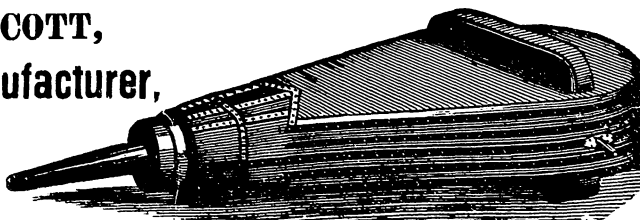
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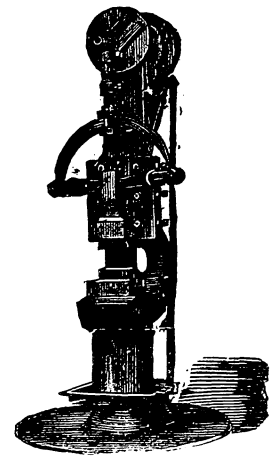
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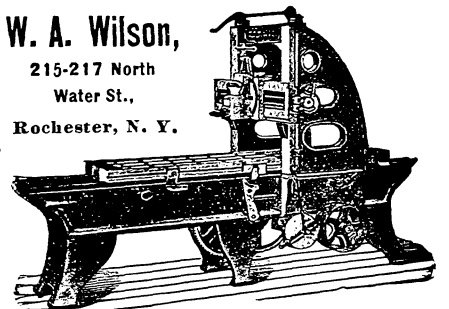
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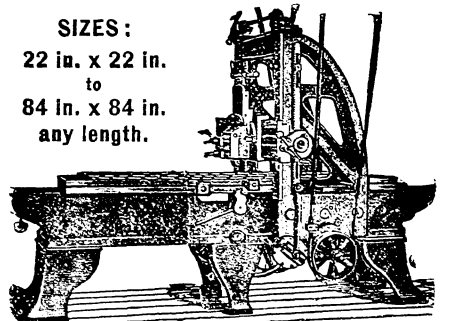


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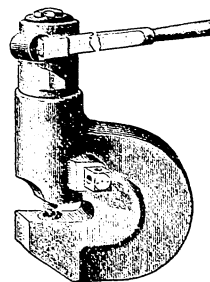
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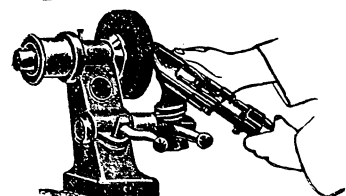
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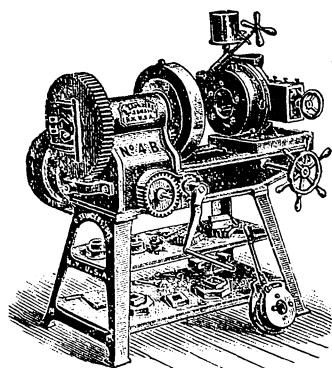


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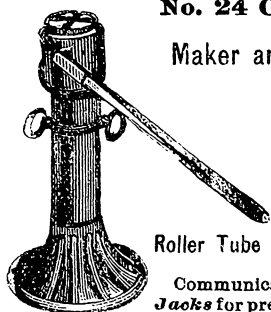
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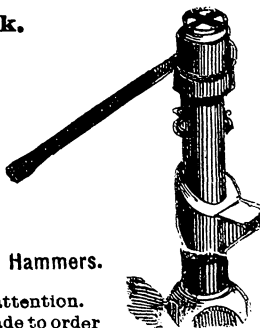
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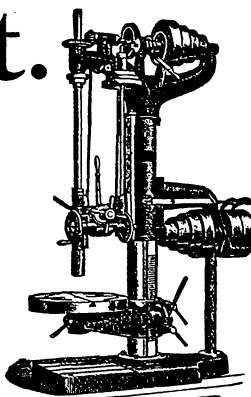
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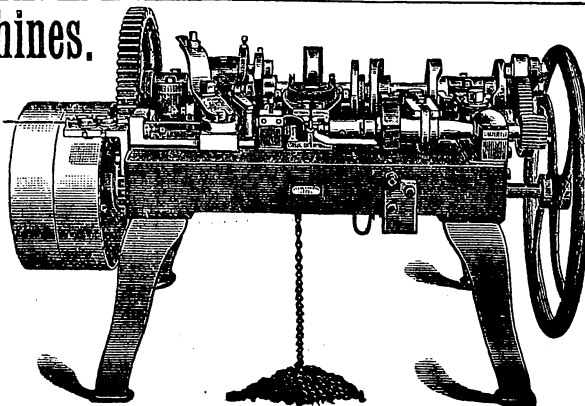
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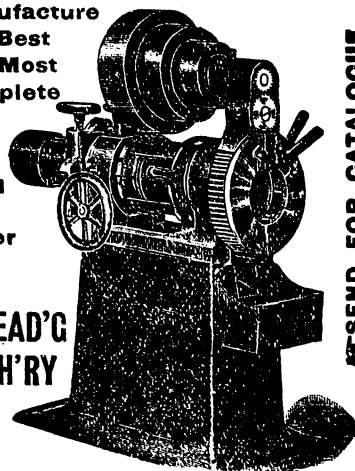


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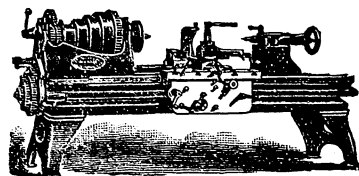
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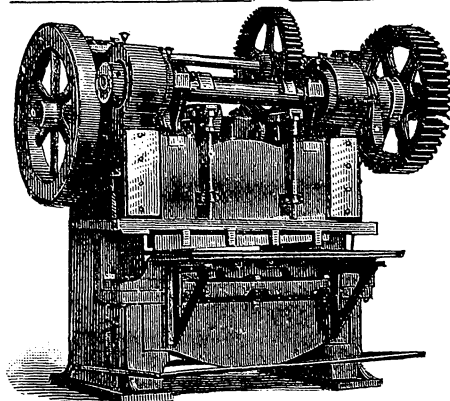
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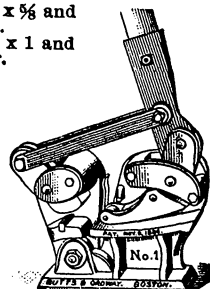
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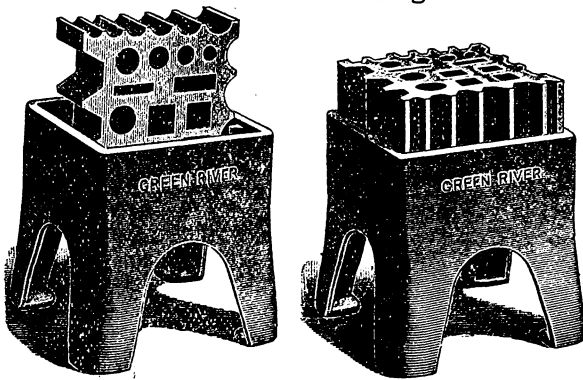
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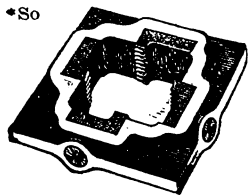
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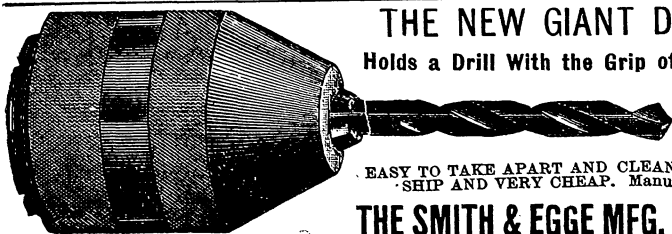
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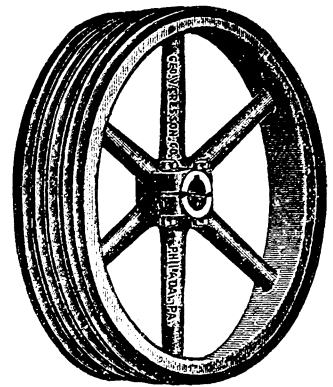
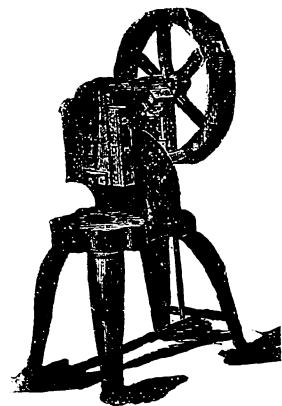
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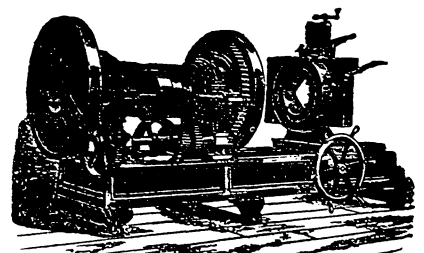
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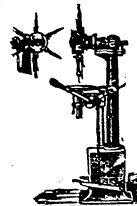
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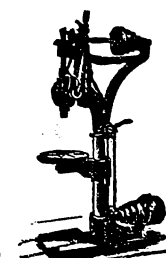
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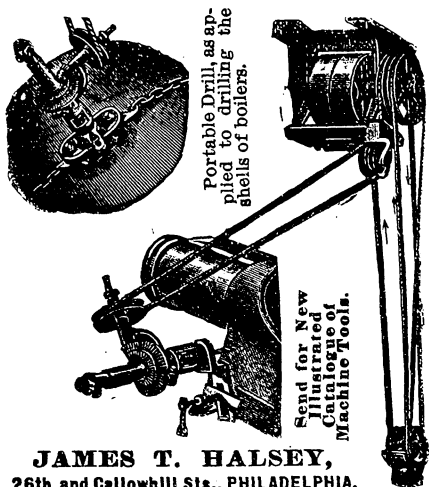
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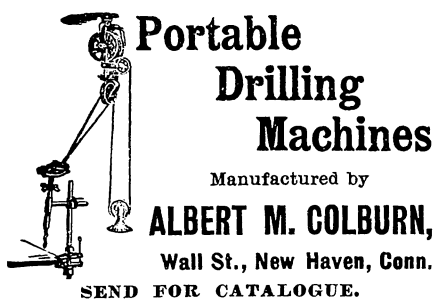
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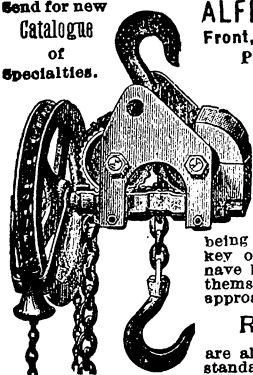


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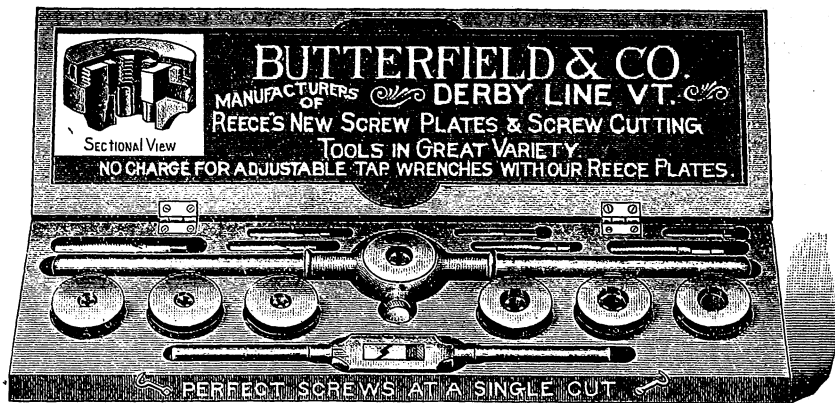
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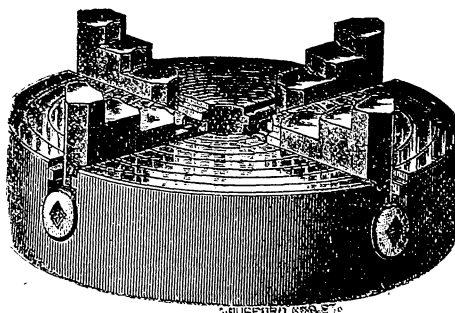
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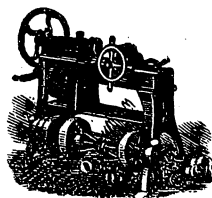


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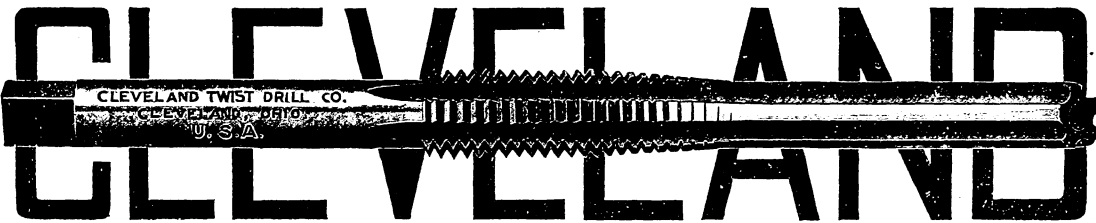
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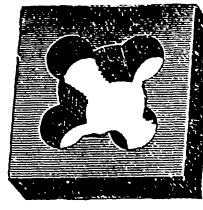
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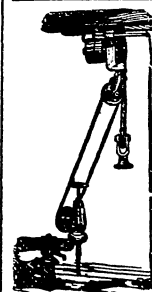
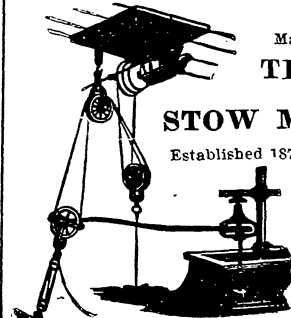
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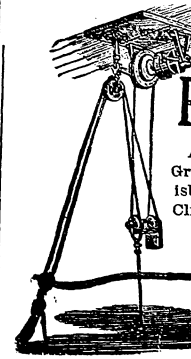
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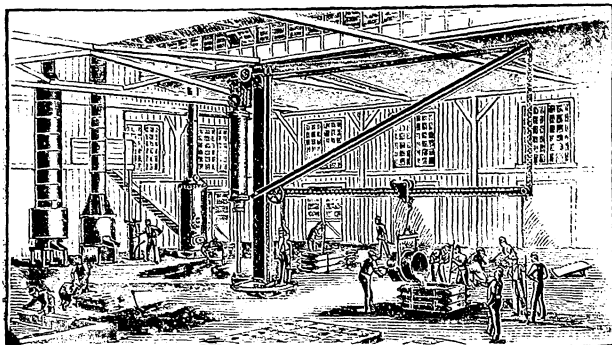
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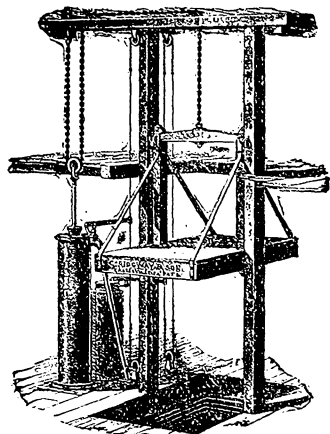
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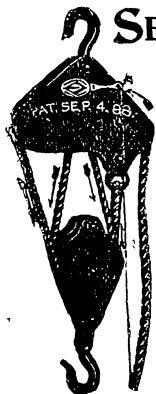
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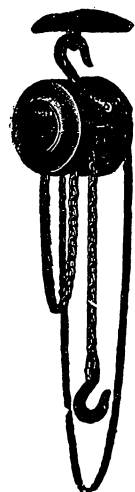
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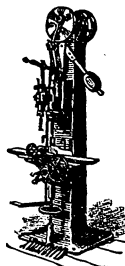
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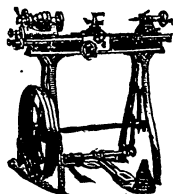
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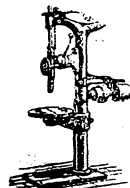
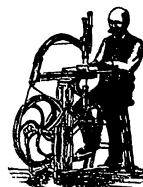
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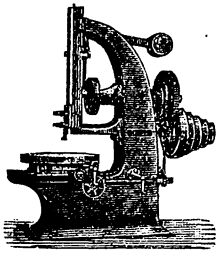
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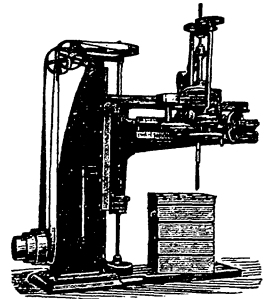
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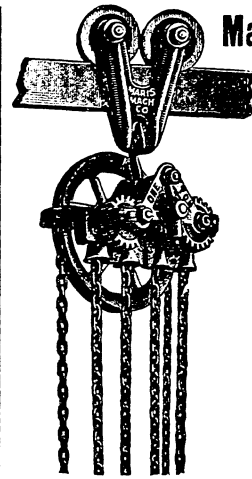
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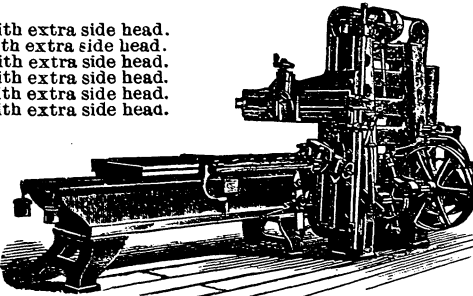
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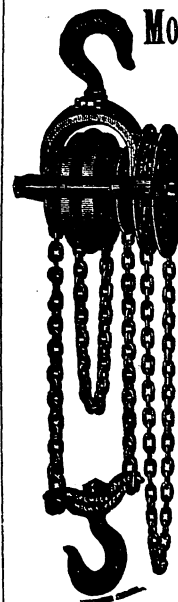
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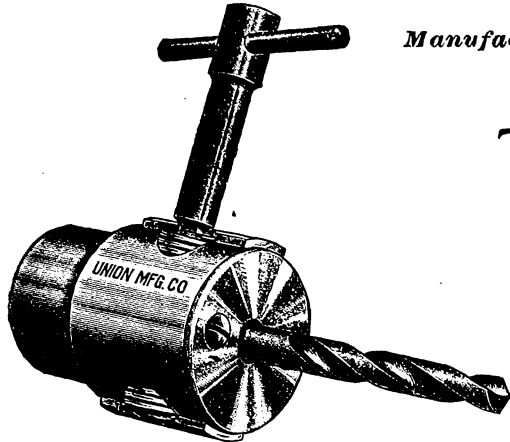
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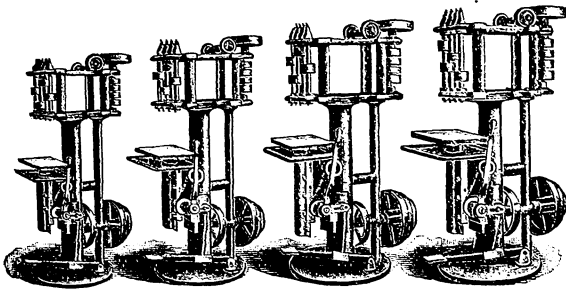


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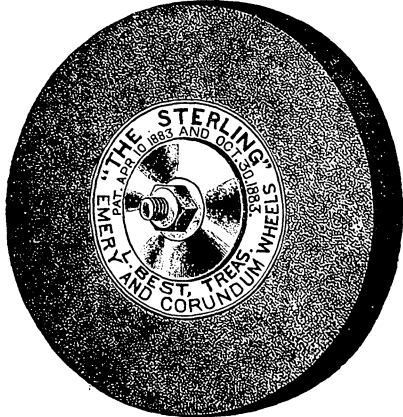


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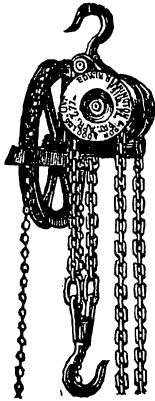


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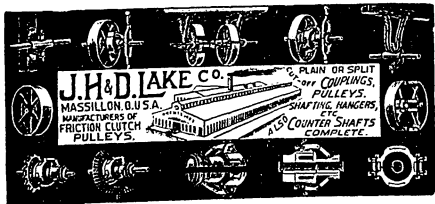
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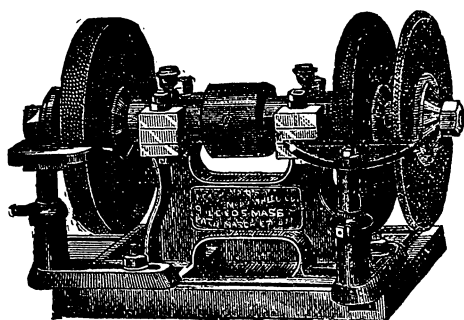
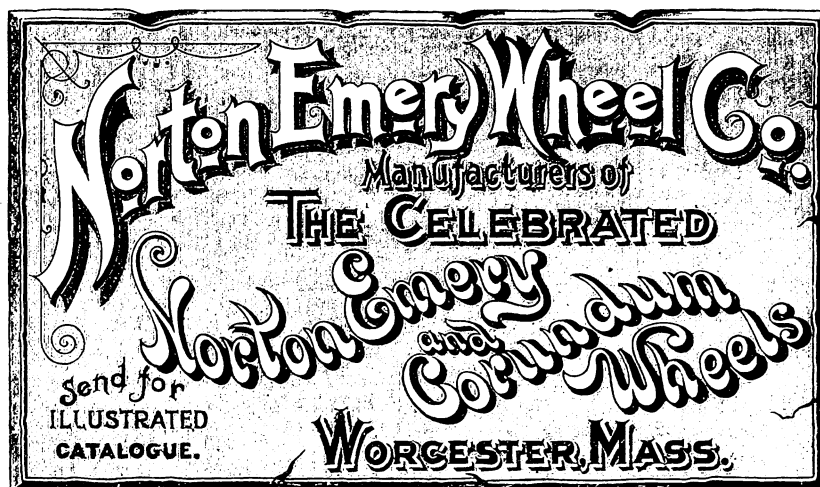
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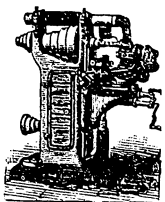
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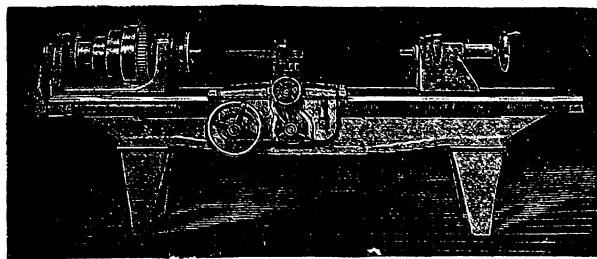
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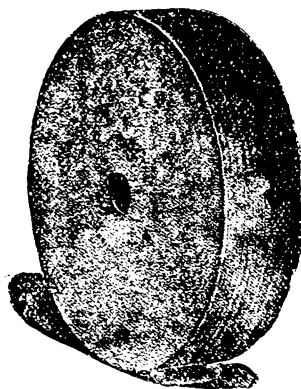
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AS FOUNDRY FOREMAN; 28 years' experience, about half that time as foreman. Address "K. N.," Box 119, office of *The Iron Age*, 96-102 Reade St., New York.

WOULD LIKE to secure position with manufacturer of hardware or commission hardware house as representative on road or house position; having been a number of years in the business, with a road experience of six years, feel confident I can make myself valuable to any company; can furnish excellent references. Address "ENERGY," P. O. Box No. 182, Baltimore, Md.

BY A YOUNG married man, as Bookkeeper or Salesman with wholesale or retail hardware house; ten years' experience; best of references as to character and ability. Address "S.," Room No. 9, Third Floor, 104 West Fourth St., Williamsport, Pa.

YOUNG MAN, able and willing to work, with experience at bookkeeping and shipping, would like position with manufacturing firm; machinery or architectural iron work preferred; will start on small salary. Address "B. & S.," 127, office of *The Iron Age*, 96-102 Reade St., New York.

AS FOREMAN of Iron Foundry; best of references. Address "HENRY B.," No. 127, office of *The Iron Age*, 96-102 Reade Street, N. Y.

A GENTLEMAN with an extensive experience in engineering and manufacturing, and highly skilled in designing, estimating and contracting, production and cost sheets, technical and business correspondence, management, &c., is free to consider a responsible engagement; if desirable can take up some stock. Address "WELL QUALIFIED," office of *The Iron Age*, 96-102 Reade St., New York.

ARE YOU REPRESENTED IN ROCHESTER, N. Y.; I have an office in the center of the city, am a subscriber to Dun's, have had a valuable business experience and desire to represent manufacturers in this prosperous city and section. Address "REPRESENTATIVE," 223 E. and B. Bldg., Rochester, N. Y.

A MEMBER OF AMERICAN SOCIETY of Mechanical Engineers, who has had 20 years' practical experience as follows: machinist, head draughtsman, erector of steam plants, engineering, estimating, contracting and office work and superintendent of large engine works, is available for responsible position. Address "A. B. C.," office of *The Iron Age*, 59 Dearborn St., Chicago.

BY CHEMIST of 4 years' experience in foundry, open hearth, and blast furnace analyses; best of references. Address "OPEN HEARTH," office of *The Iron Age*, 96-102 Reade St., New York.

BY AN EXPERIENCED HARDWAREMAN, ten years' experience, three years' on the road; good salesman and stock keeper; West or Southwest preferred; best of references. Address L. W. VIVION, Benton City, Mo.

A WELL KNOWN and successful Blast Furnace Superintendent or Founder will be open for engagement after Oct. 1st, 1893. Is thoroughly competent as constructor or in the management. Practical, theoretical and in touch with latest improvements in blast furnace practice. First-class record and references. Address "BLAST FURNACE, No. 921," office of *The Iron Age*, 96-102 Reade street, New York.

HELP WANTED.

Undisplayed Advertisements for Help Wanted not exceeding fifty words One Dollar each insertion. Additional words two cents each.

EXPERIENCED hardware salesman to travel in Mexico; must be thoroughly competent hardwareman; preference given to one who has Mexican experience; knowledge of Spanish language desirable. Address P. O. Box 183, New York.

SALESMEN visiting hardware trade to sell as a side line on commission our Unique Self Heating Hair Curler; it sells equally as well to the following dealers: Druggists, Jewelers, Bazzars, Dry Goods, News Stands, etc. Address, with references, UNIQUE NOVELTY CO., 99 to 103 Abbot St., Detroit, Mich.

A YOUNG MAN with scientific education, preferably with some experience in iron and steel, as assistant, to keep records, inspect product, &c., &c.; a good opening for a capable young man willing to work. Address, giving age and full particulars, "A. Z.," 1214, office of *The Iron Age*, 96-102 Reade St., New York.

AN EXPERIENCED MAN to take charge of the night turn in a small rolling mill near New York; must have had experience in working scrap iron. Address, stating salary expected, "MERCHANT IRON," office of *The Iron Age*, 96-102 Reade St., New York.

SALESMEN to sell German hardware and cutlery on commission; only those with experience and trade need apply. Address "SORINGEN," office of *The Iron Age*, 96-102 Reade St., New York.

AN INTELLIGENT, ENERGETIC young man, familiar with machinery, boilers and engines, to assist in general repair work, and to aid in constructing special machinery; steady employment; wages, \$2.50 per day. Address, giving full particulars and references, "L.," care Letter Carrier No. 9, Black Rock, Buffalo, New York.

EXPERIENCED SALESMAN to travel and sell wire goods and solicit orders on iron work where necessary; state where last employed and salary expected. Address "WIRE GOODS," office of *The Iron Age*, 96-102 Reade St., New York.

SALESMAN in every large town to sell a staple line of hardware on commission. Address "EDWARDS," care E. S. Adams, office of *The Iron Age*, 312 The Cuyahoga, Cleveland, Ohio.

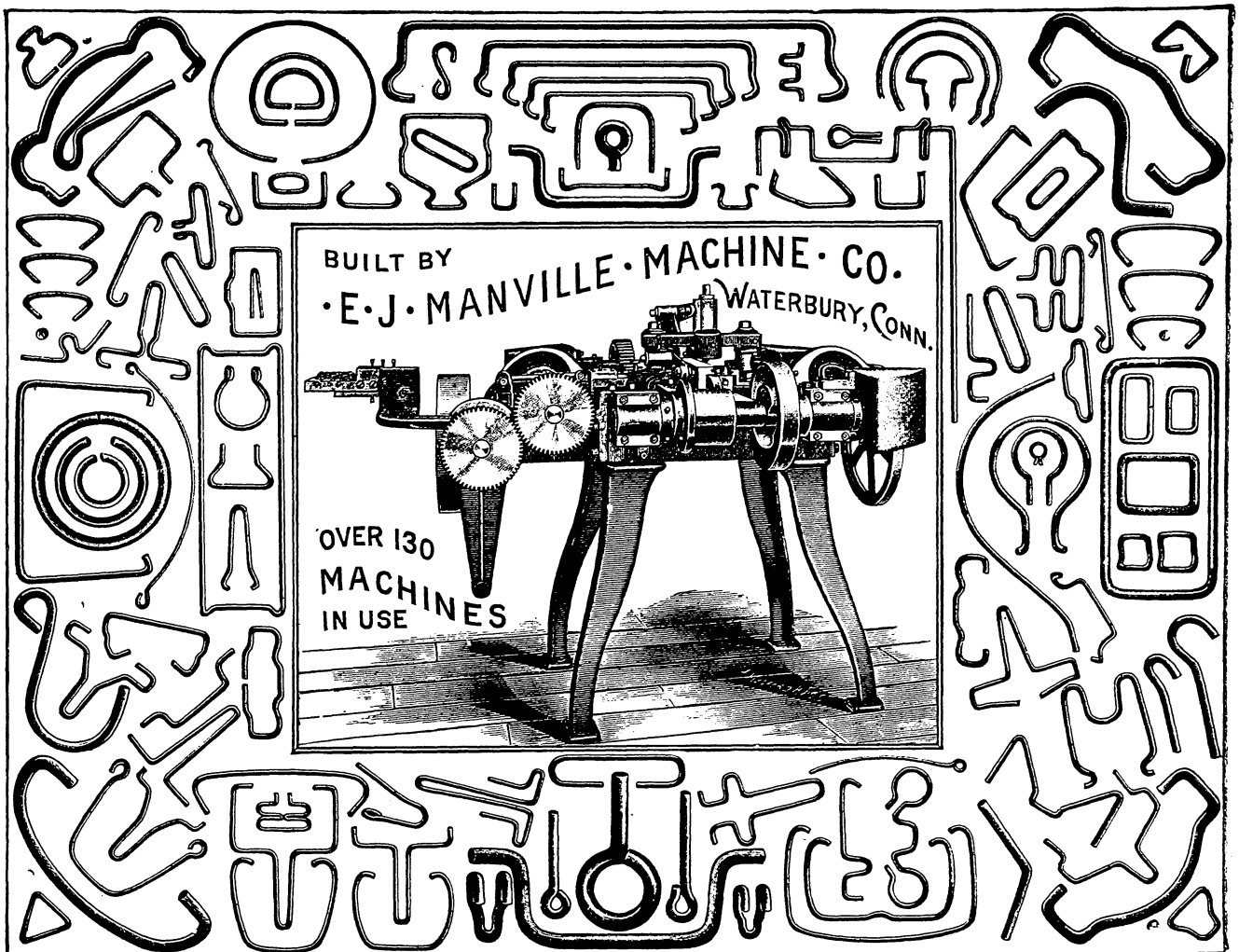
FOR THE EASTERN STATES, a first-class salesman in Builders' Hardware line. Must control trade and give good recommendations. Address "BUILDERS' HARDWARE MFR.," office of *The Iron Age*, 96-102 Reade St., New York.

A GOOD BUILDERS' HARDWARE Salesman acquainted with trade in territory from Denver to Pacific Coast. Address, stating age and experience, "M. B. M.," Box 1207, office of *The Iron Age*, 96-102 Reade Street, New York.

SALESMEN to sell on commission to the hardware, plumbing and rubber trade the best and cheapest line of lawn sprinklers made; see advertisement in this paper. Address ETTE & HENGER MANUFACTURING CO., St. Louis, Mo.

A FEW RESPONSIBLE PARTIES for the States of Pennsylvania, Maryland, Illinois, Ohio, Vermont, Massachusetts and Maine, to sell our high grades of Babbitt Metal and Solder, either on commission or as jobbers. Apply to the SYRACUSE SMELTING WORKS, Syracuse, N. Y.

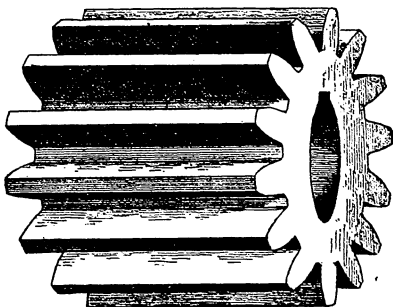
COMPETENT FOREMAN, in wrought iron and wire factory; must be experienced in all its branches; give references and salary expected. Address "WIRE AND IRON WORKER," office of *The Iron Age*, Bank of Commerce Building, St. Louis.



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OVER 130
MACHINES
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HYDRAULIC FORGING.



Patent Hot Pressed Gear. Made from Solid Billet. Accurate to Size. No Cutting of Teeth Required.

Steel Bottles, Air and Gas Receivers drawn from Solid Steel or Plates, Crank Shafts, Straps, Wrists, Pins, Irregular Shapes, Discs, Cups, Boiler Heads, Steel Flanges for High Pressure Steam, Drawn Steel Tubing for Bicycles, Boilers, Etc.

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YOU CAN TIN CAST IRON

By the Flanders process, now in use by some of the largest firms in the country. Correspondence solicited for the erection of galvanizing or tinning plants. Address

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Time Record and
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(Pat. Oct. 13, 1891.)
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HENRY W. SCATTERGOOD,
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Machine & Tool Wks.

MANUFACTURERS OF
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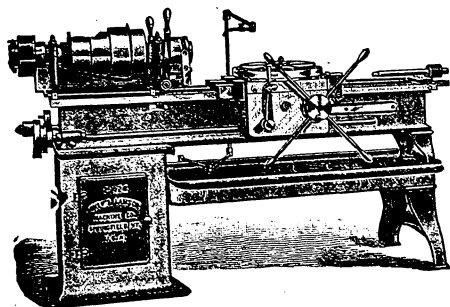
Controlling the Adams-Blair Process and other Steel and Iron Patents.

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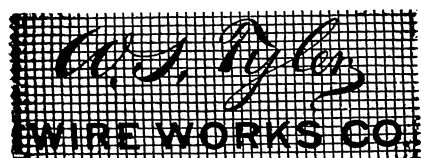
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If not send for

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Metal Elevator Cabs,

Of Our Own Special Design,

In Any Finish Desired, Estimates Given

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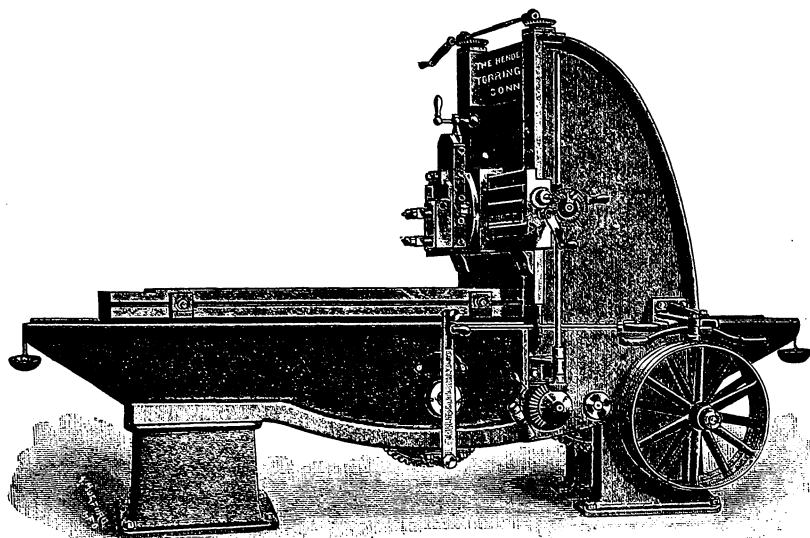
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Offer Aluminum guaranteed equal in purity to the best in the market, at lowest rates obtainable.

**ALUMINUM SHEET, WIRE,
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Iron Planers at Reduced Prices.

We have on hand a few new planers of this pattern, and in order to dispose of them quickly, we would make a good reduction in price of same. The sizes are 16 inch, 22 inch, 24 inch and 27 inch. If you are in need of a good planer write us for prices on these.

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DO YOU BORE CYLINDERS?

THE HORIZONTAL BORING MACHINE

IS A SPECIAL TOOL FOR THIS PURPOSE.

SEND FOR PARTICULARS TO

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B. & B. Stoves are the Leaders.

B. & B. Combination Oil Heaters and Cook Stoves are a great success, as proven by the many testimonials received from all parts of the country.

Every Stove is mounted on rollers, and can easily be moved from room to room. They can be used in place of a range in the kitchen or in place of a base-burner in the parlor. They are thoroughly well adapted to fill all requirements, combining as they do all the qualities of a first-class Oil Heater and an elegant Parlor Cook Stove.

If you happen to have one of them upstairs, the tank can easily be removed and taken down to the kitchen to be filled, and again replaced in the Stove.

Those who have used the old style Stove with tanks fastened in them as tight as if cast in the iron will appreciate this feature. They can be fitted with our 2-hole, 3-hole or 4-hole Extension Tops for regular 8-inch ware. We want your trade, and if you will give us a chance to quote you prices we will have it.



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The standard by which the merits of a Freezer are gauged is, how near it comes to being as perfect as the

WHITE MOUNTAIN ICE CREAM FREEZER.

It always has been, and is still, the best. Try them.

Manufactured by The White Mountain Freezer Co., Nashua, N. H.



THE OLD RELIABLE STANDARD FREEZER

has the reputation of being the BEST ICE CREAM FREEZER ever introduced. STRENGTH, DURABILITY, NEATNESS AND EFFICIENCY are prominent points in the manufacture. Full Size Can, CEDAR TUB, Detachable Hinged Crossbar, Self-adjusting Vibratory Scraper, etc.

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20 North Fourth Street, Philadelphia.

THE "New" Keystone Beater,

No. 20 for Family Use.

JAR ENTIRELY COVERED.

No more Spattering.

CAN BE USED ANYWHERE.

Standing or Sitting.

ALWAYS READY FOR USE.

Nothing to be fixed.

SIMPLY PERFECT.

No. 20.—Jar holds 1 quart level full. Complete Machine securely packed in one single package. 1/2 dozen packed in case.

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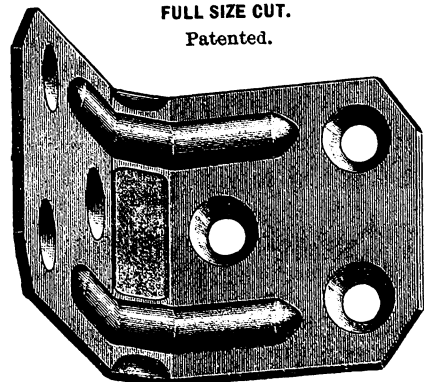
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Manufacturers of Hardware Specialties for Household use
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EGGS.
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BATTERS, DRINKS,
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MELLOW FRUITS,
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FULL SIZE CUT.
Patented.



CORRUGATED STEEL CORNER BRACES.

A SUPERIOR ARTICLE.

Plain, Japanned or Bronzed.

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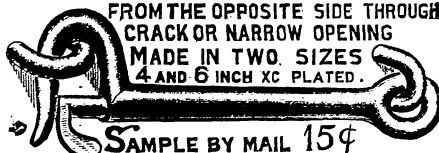
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POSITIVELY PREVENTS BEING UNHOOKED
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CRACK OR NARROW OPENING
MADE IN TWO SIZES
4 AND 6 INCH XC PLATED.



SAMPLE BY MAIL 15¢

Call for Our Banner Bolt Snap:

This snap has many important advantages over other makes of Bolt Snaps, viz.: It is lighter, the spring is entirely covered and protected from foreign substance and freezing, and is lower in price.

Made in all sizes; Round, Loop and Open Eye. We are headquarters and the most extensive manufacturers in Saddlery, Coach and General Hardware Specialties.

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By C. D. PARKHURST.

Gives directions and working drawings for making an electric motor to run sewing machines, small lathes, etc., with rules for constructing the battery to furnish the electrical current, and much practical relative information.

A table indicating the difference in wire gauges is included.

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THREE SIZES.

No. 0 takes any drill from 0 to 1-2 inch inclusive.

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They are the strongest and most durable made. Drill absolutely in the center. No twisting or bending necessary if drill is straight. Can be fitted to hollow spindle lathes for working long rods.

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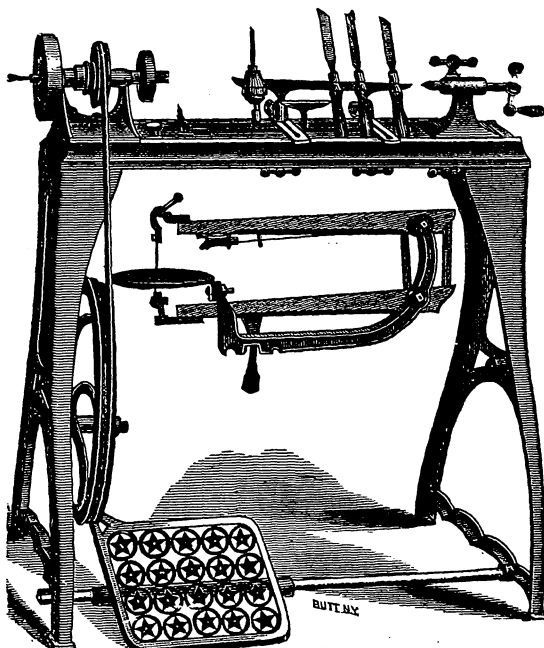
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HAIR FELTING for covering Boilers, Steam and Water Pipe, and lining Refrigerators.

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These two machines are taking the place of all others, and are now the most in demand throughout the world.

No dealer can make a mistake by laying in a stock of them. About Christmas time they are wanted in every town, and will make business lively at this otherwise dull season.

We also keep a full stock of Designs, Wood, and all other Scroll Sawing goods.

Price of Goodell Lathe, complete, \$12.00.

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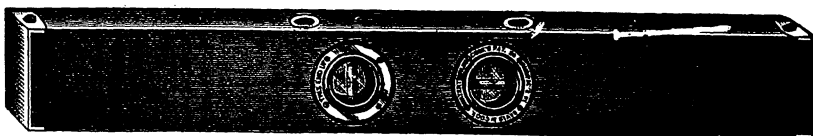
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Each pulley its own
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ALL HAVE STEEL AXLES

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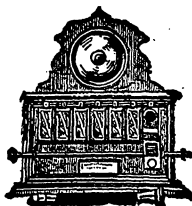
**COOK'S
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Made in Wood and Iron. Every Level Fully Guaranteed.

Inquire at your nearest hardware store for them. If not in stock, send to

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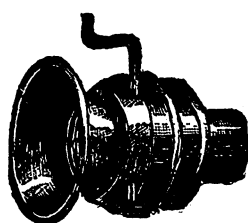


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THE DEALER who sells what
THE PEOPLE ask for.

MAKES FRIENDS and MONEY, and
SAVES TIME and TROUBLE.

The people ask for

LePage's
Liquid
Glue, And the people are right.

It is the strongest and best glue made. It has been
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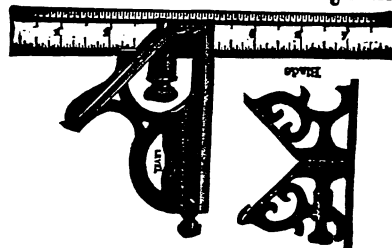
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Ratchet Wrenches.

Made of best forged Tool Steel; are
easily and readily adjusted and con-
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work by throwing over the lever in
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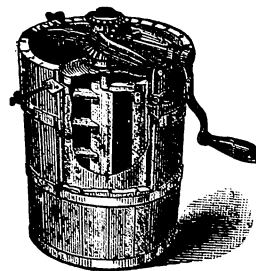
The Set of Combination Tools No. 1
includes the wrench, two sockets, one
for screw-driver, bit or reamer shank,
with wood handle, and one socket



for drill shank and feed nut. The
jaws on this wrench open from 8-16
to 1 1/4 inches.

Send for Illustrated Circular
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The Keystone Mfg. Co.
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"Home" Freezers,
2 to 10 quarts.

"Rapid" Freezers,
2 to 40 quarts.

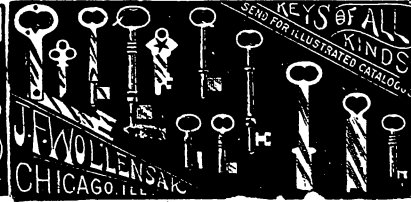
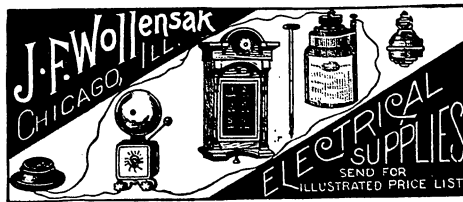
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Ice-Breakers,
4 sizes.

Sundry Ice-Cream
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"RAPID."

Send for Descriptive Catalogue and Attractive
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THE OLDEST AND MOST EXTENSIVE MANUFACTURERS OF

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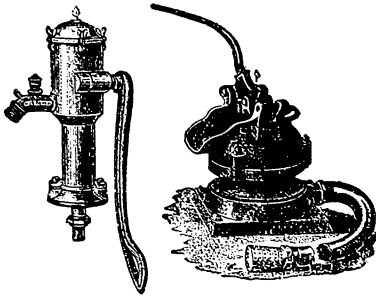
A LARGE CAPACITY AND EASY WORKING PUMP FOR

Water Works, Sewer Contractors, Foundation Builders, Mines, Quarries,

Fig. 209.

Fig. 881.

Fig. 145.



or wherever it is desired to raise a large quantity of water by
hand power.

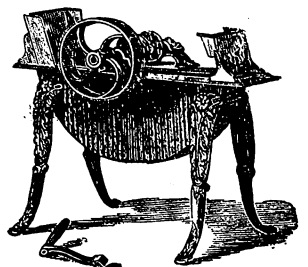
The pump has large valves (accessible by hand), and will pump water containing sand, gravel, sewage matter, &c., without choking or any perceptible wear.

CAPACITY

from 3,000 to 4,500 gallons per hour.

These pumps are simple, durable and low priced.
Made either as shown in cut for Hose or for **IRON** Pipe Suction underneath.

Send for Circular and Price List.



C. I. Grindstone Frame.

THE DEMING
FACTORY
SALEM O. U. S. A.
MANUFACTURERS OF
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N. Y. OFFICE 72 JOHN ST.
HENION & HUBBELL
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55 & 57, N. CLINTON ST.
CHICAGO, ILL.

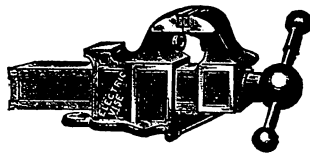
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Ashland Pump and Hay Tool Works.

The New York Safety Dumb Waiter.
"The Manhattan Dumb Waiter."
"The Improved Humphrey Hand Elevator."
Made specially to be sold by Hardware Stores.
Thousands in use. Catalogues on application.
THE STORM MANUFACTURING CO.
NEWARK, NEW JERSEY.
Formerly of Poughkeepsie, New York.

VISE.

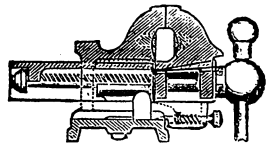


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IT HAS QUALITIES THAT ARE UNDISPUTED.

Rapid, Active, Prompt.

One movement in and out, one turn of the hand and the work is secured.



The Capital Machine Tool Co., AUBURN, N. Y.

PRENTISS' PAT. VISES.

The Leaders for 20 Years.

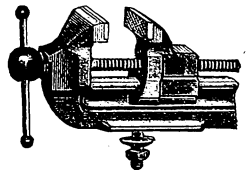
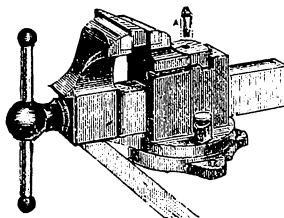
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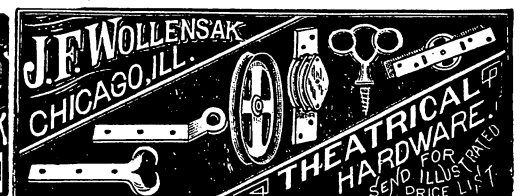
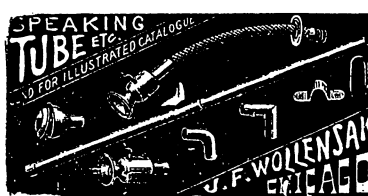
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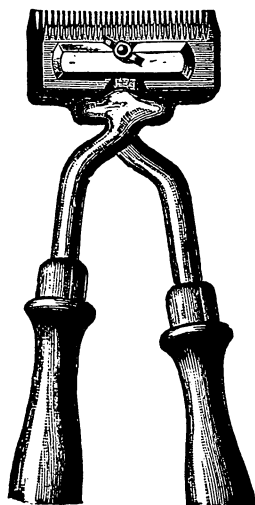
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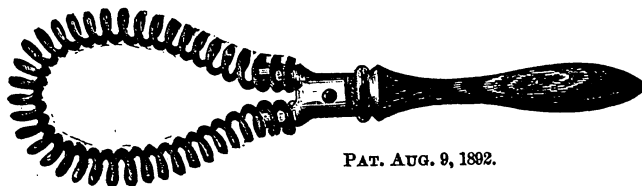
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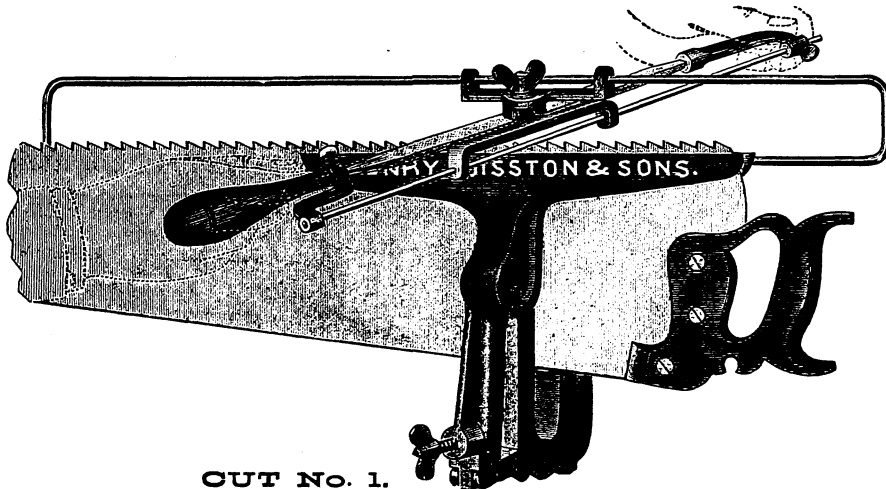
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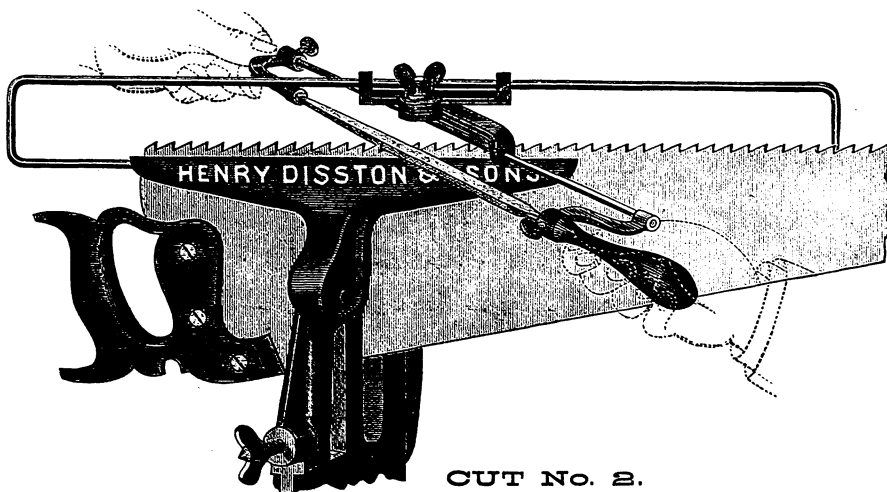
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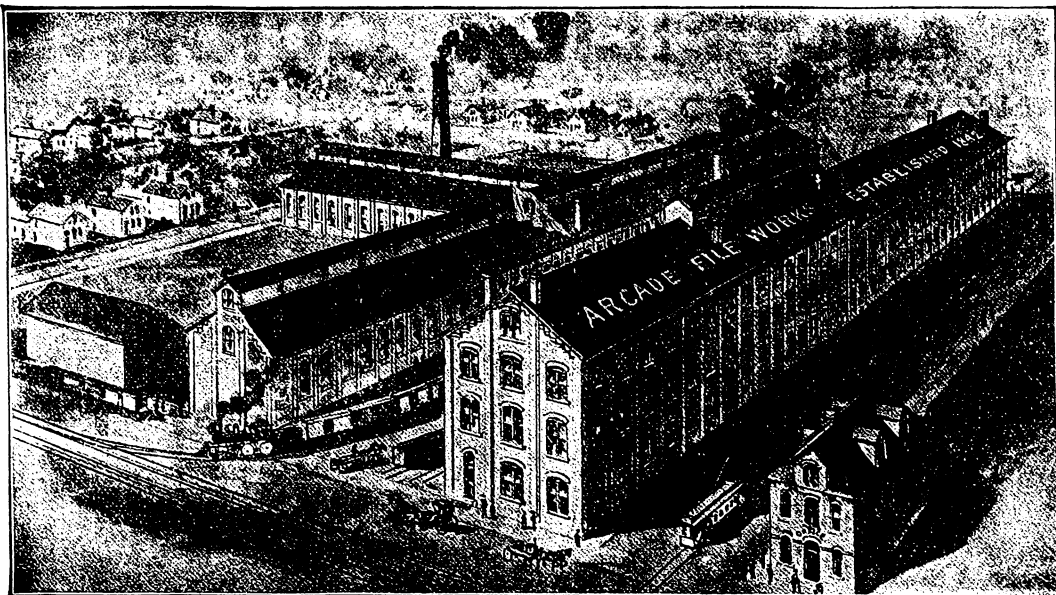
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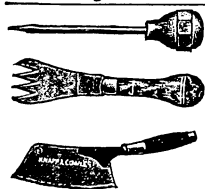
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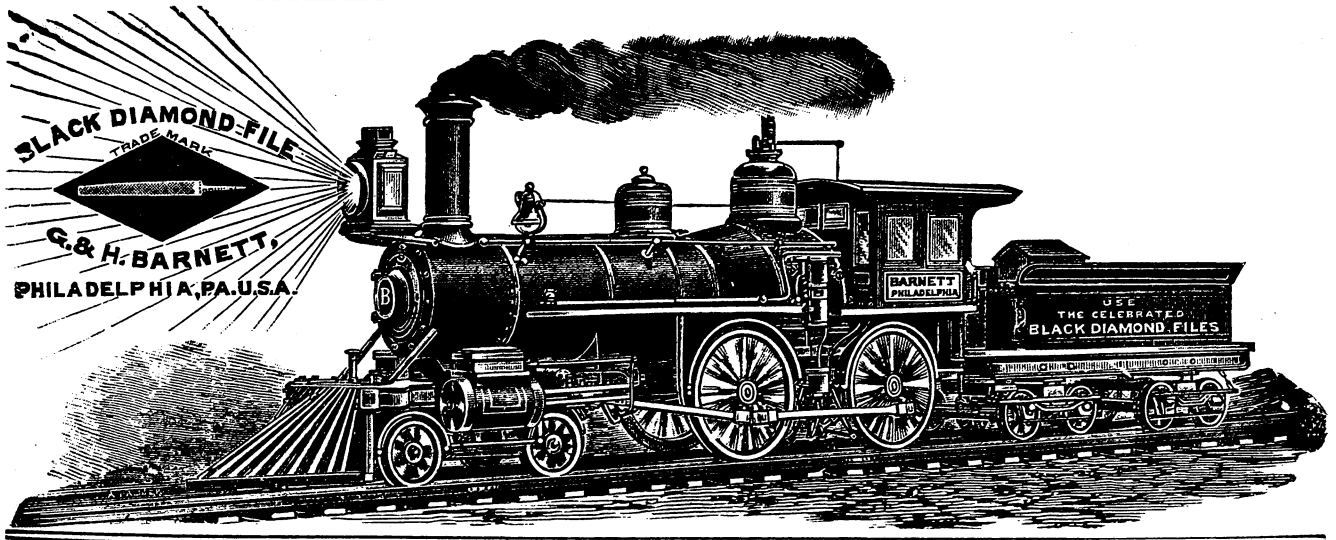
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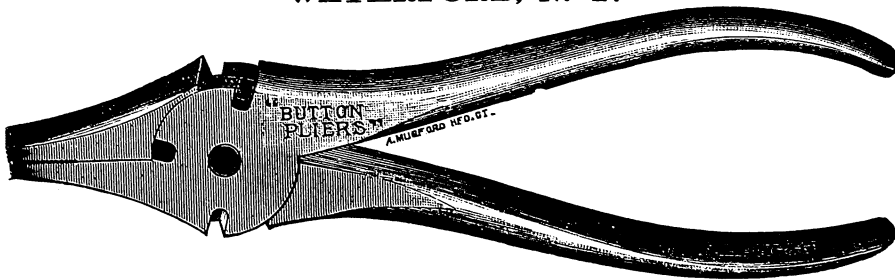
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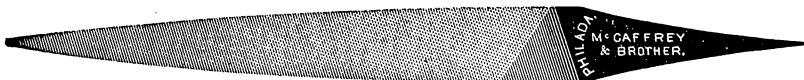
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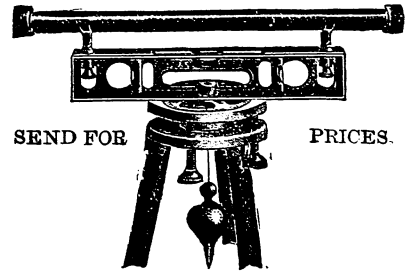
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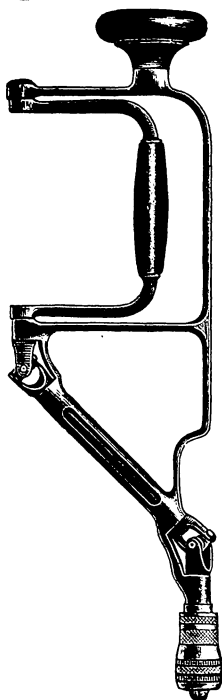
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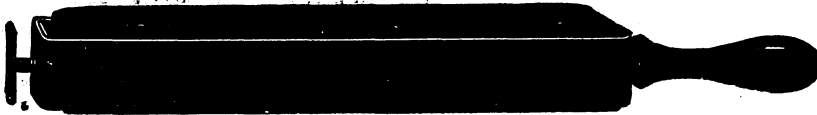
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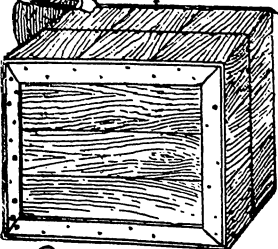
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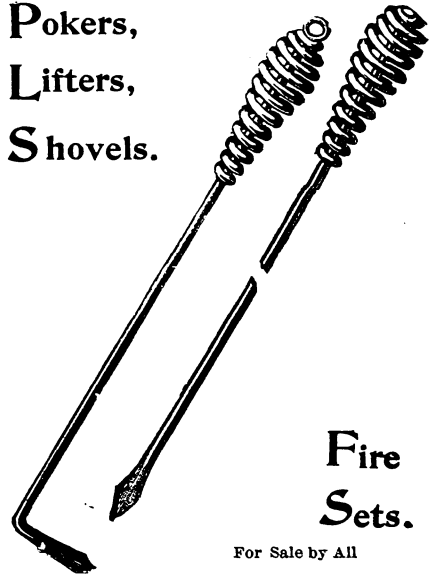
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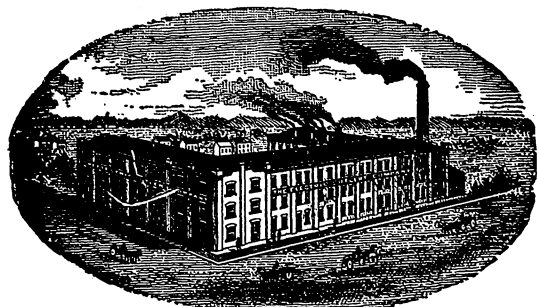
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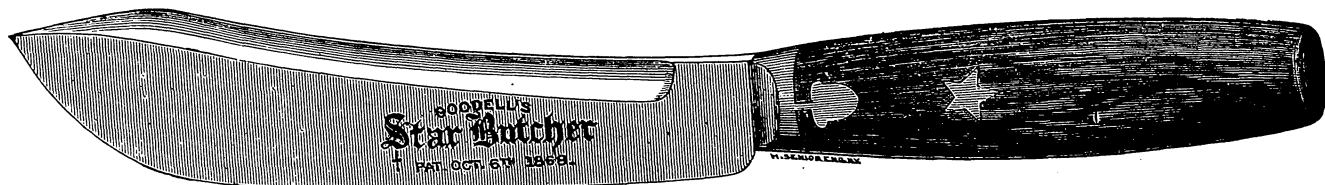
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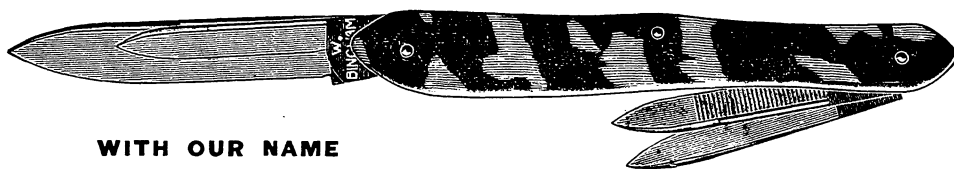
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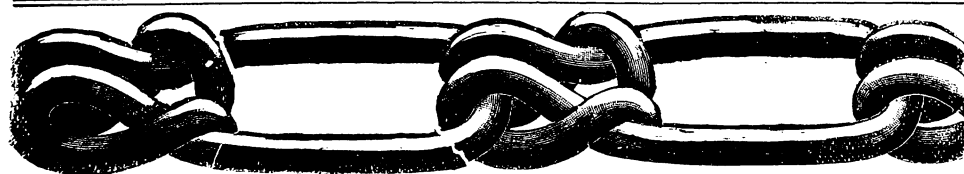
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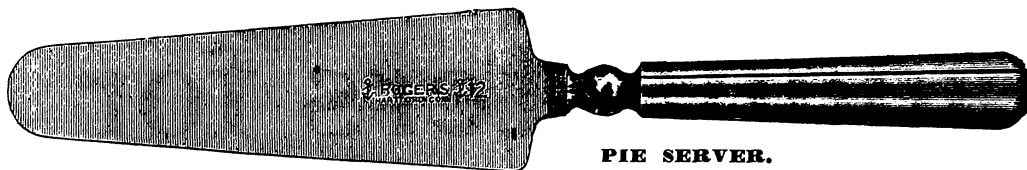
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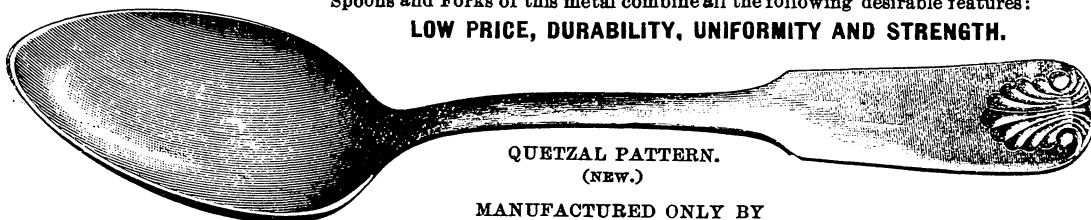
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AZTEC COIN METAL

MADE INTO SPOONS AND FORKS.

Spoons and Forks of this metal combine all the following desirable features:

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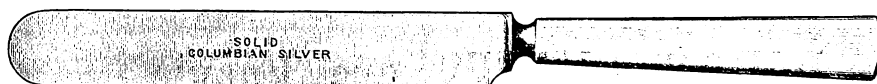
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THE HOLMES & EDWARDS SILVER CO.,

Bridgeport, Conn.

AZTEC COIN METAL
has no plating to
wear off. Made
of solid metal.
Easily kept clean.

Solid Columbian Silver Flat Ware, a Substitute for **Solid Silver.**
WARRANTED FOR 25 YEARS.



There is no plating to wear off and no rusty edges. The cost is no more than silver plated goods. Hotels and restaurants appreciate this great change, which will, no doubt, in time revolutionize the steel knife trade. We ask the trade not to confound this metal with silver metals, nickel silver or any other quack named goods which are flooding the market at the present time.

SELL AT SIGHT.

KNIVES,
FORKS &
SPOONS.—THE—
UPSON & HART CO.,

UNIONVILLE, CONN.

Also manufacturers of Silver Plated Flat Ware in Knives, Forks, Spoons, Sugar Shells, &c
A sample dozen will be sent on approval to any house in the United States, with prices and discounts. Remember it costs nothing to investigate.

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Single Spiral Double Cutter Auger Bits and Augers.



We have purchased from the assignee of the Bailey Auger Bit Co. the entire stock of their auger bits, car bits and augers, and offer them at prices that defy competition. Note why this bit is superior to many others.

The large receptacle in the spiral is so arranged as to hold the chip back from the wall of the hole, and force it up and directly out, thus making it impossible to choke and easily turned by the operator. It is a rapid cutter, because it has a double threaded screw point, put on by a machine specially designed for that purpose, which causes the point to cut its way into wood, and thus obtain a firmer hold. In quality of steel, workmanship and style of tool it has no equal.

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WHOLESALE HARDWARE,

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BRITANNIA SPOONS
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THEIR MAKE IS EQUAL
IF NOT SUPERIOR
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HAVE BEEN IN BUSINESS SINCE 1840.

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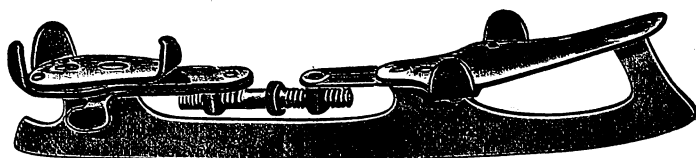
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The most extensive Skate Factory in the World.

In EVERY LAND where water freezes
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FACTORY AT SPRINGFIELD, MASS.



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MEDAL and DIPLOMA.

Why not get the BEST?

FOR SALE BY ALL LEADING JOBBERS OF HARDWARE
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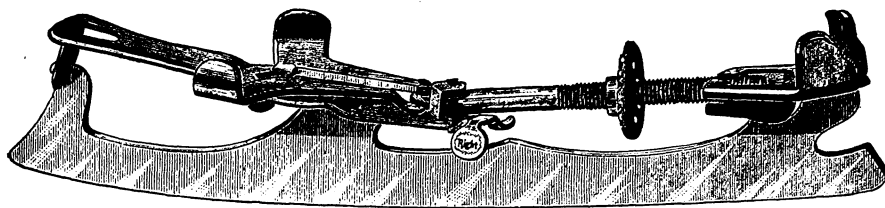
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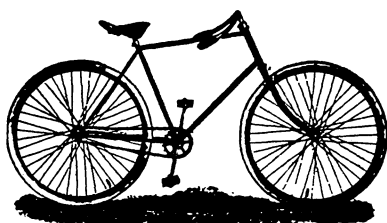


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From \$20

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Eagle Files.

Union Steel Screw Co.'s Screws.

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YOUR SKATES WILL NOT RUST

IF YOU USE

PARAVASELINE.

It is a Lubricant that will prevent all kinds of metals from rusting.

WHEN YOU COME HOME AFTER SKATING

apply a light coat of Paravaseline to your skates and it will keep them in good condition.

ONE TUBE WILL LAST A YEAR

and will be mailed to any address on receipt of 25 cents or you can get them at all hardware or skate stores.

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THE BRIDGEPORT GUN IMPLEMENT COMPANY,

313 & 315 Broadway, New York.

ARCTIC ICE DOGS.

Fig. 1.

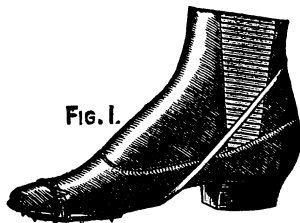
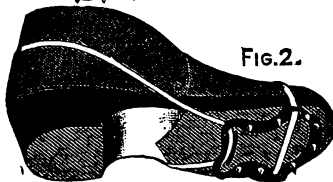


Fig. 2.



These Ice Dogs, or Creepers, designed to secure safe footing on slippery pavements, are the simplest and best ever invented. They consist of a very light, malleable casting of the best quality of iron, fitted for the sole of the shoe and fastened to the foot by means of a toe-strap and an endless elastic band drawn high over the heel, thus holding the dog to its place, and being easy of adjustment, is very quickly put on or taken off.

There are two sizes, for ladies and gentlemen respectively, and the peculiar adjustment attaches them equally well to boots, shoes or rubbers, without difficulty or delay.

Retail at 50c. per pair. Liberal discount to dealers.

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L. W. FERDINAND & CO.,

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Please mention The Iron Age when you write.

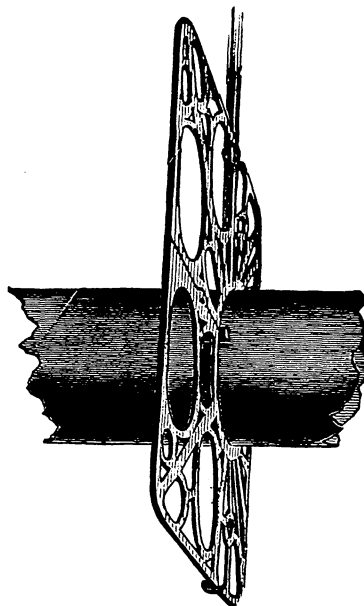
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STANDARD STOVE PIPE SHELF.



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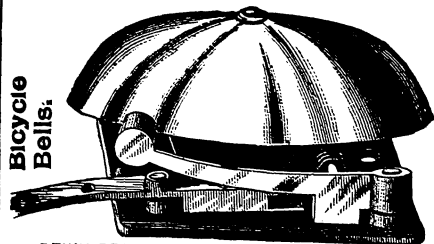
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Especially Low Prices.

We manufacture hardware specialties of all descriptions to order.

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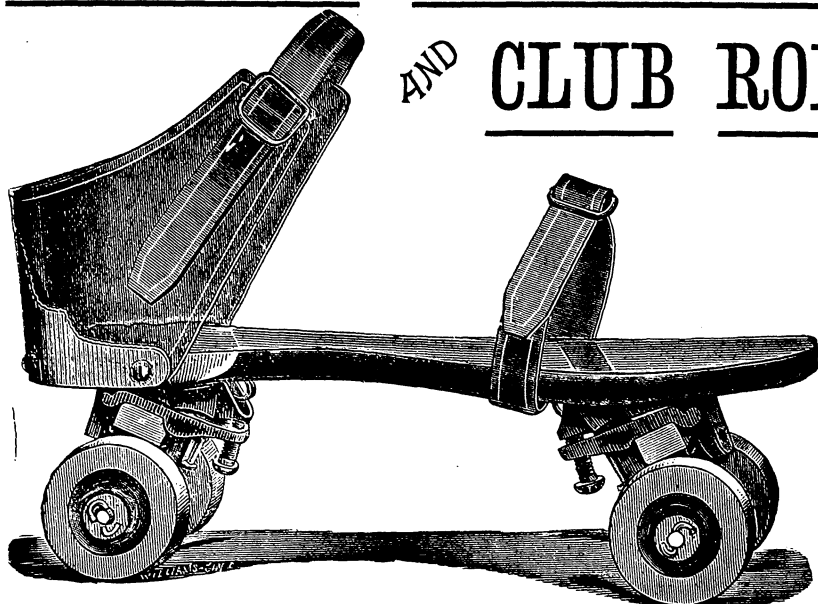


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Manufacturers of

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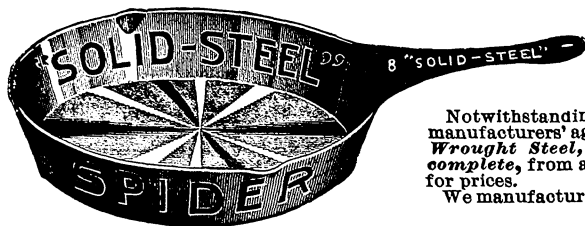


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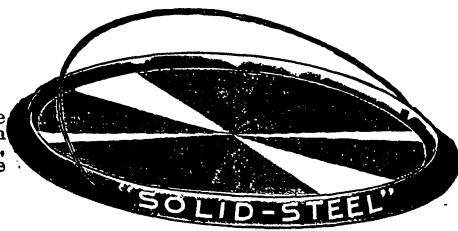
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No Seams, no Rivets in "Solid-Steel" Ware.

Made either with Balls or Solid Handles.

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We do Light and Heavy Stamping and Blanking. Also build Dies and Stamping Machinery.

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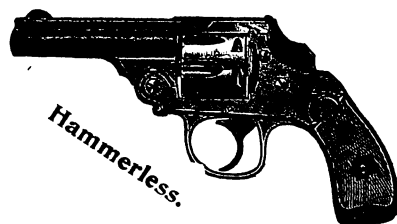
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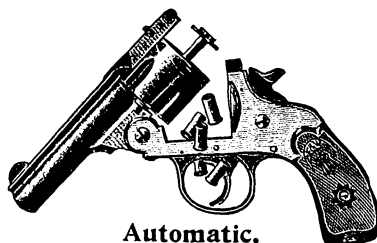
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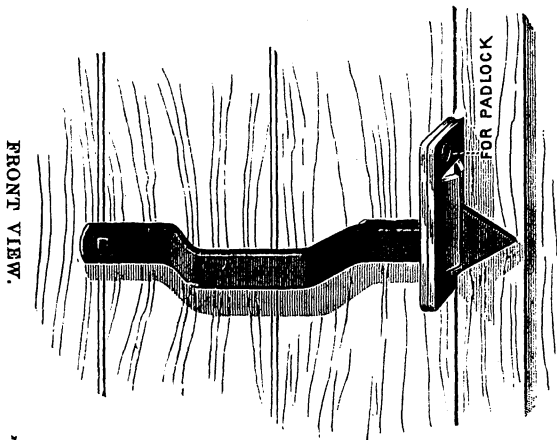
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IT IS DESIGNED especially for sliding doors. It is strong, durable and practically unbreakable. It is adapted for either right or left edge of door. It may be applied to either the inside or outside of door. It is also adapted for use on double door. It has no exposed screws or bolts that can be tampered with from the outside.

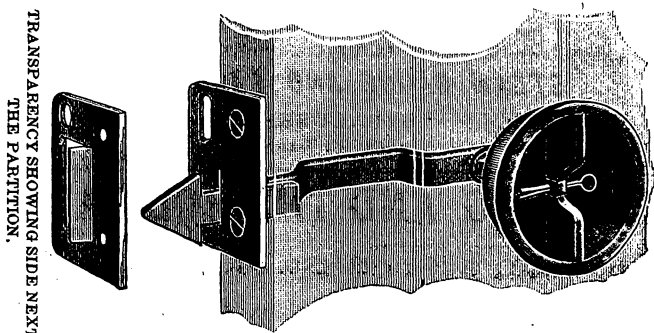
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MADE FOR THE 22 OR 25 RIM FIRE CARTRIDGE.

WEIGHT, 4 1/2 POUNDS.
22-INCH BARREL.
LEVER ACTION LIKE SHARPS.
TAKEN APART IN TEN SECONDS.
IT IS SIMPLY IMPOSSIBLE
TO MAKE MORE
ACCURATE SHOOTING BARRELS
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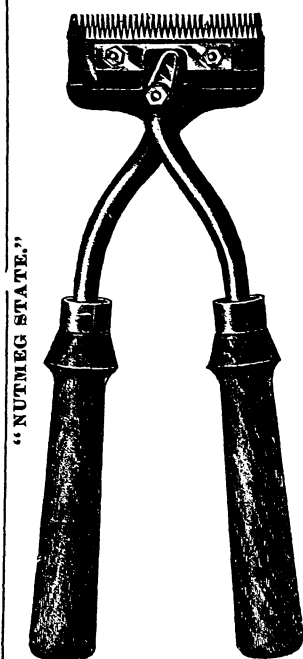
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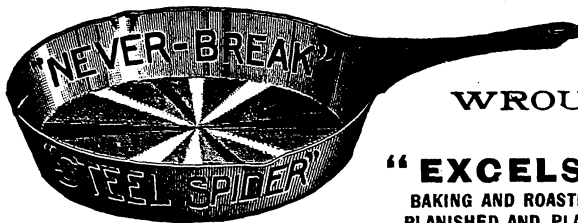
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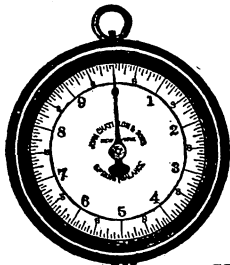
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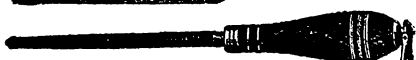
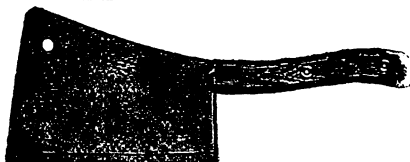
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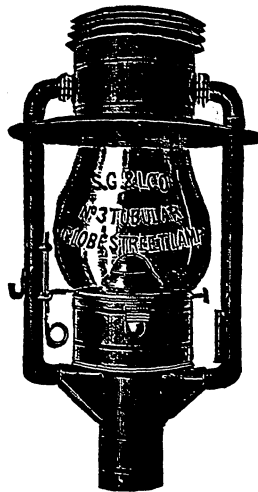


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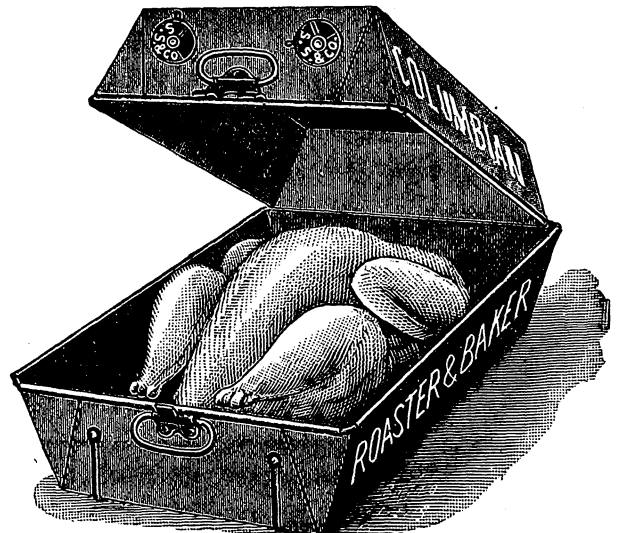
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THEY OPEN
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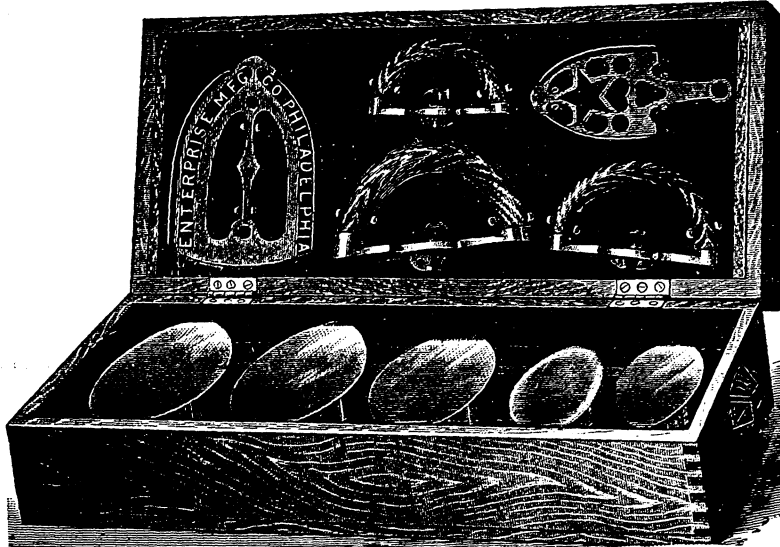
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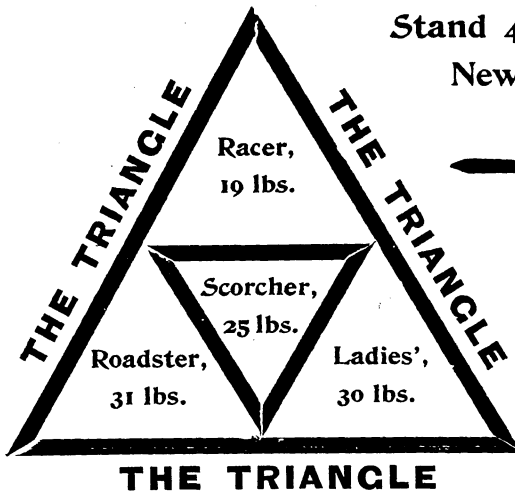
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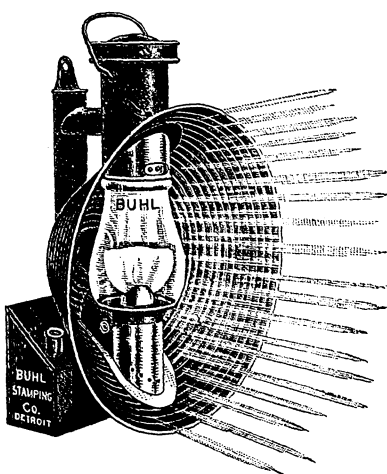
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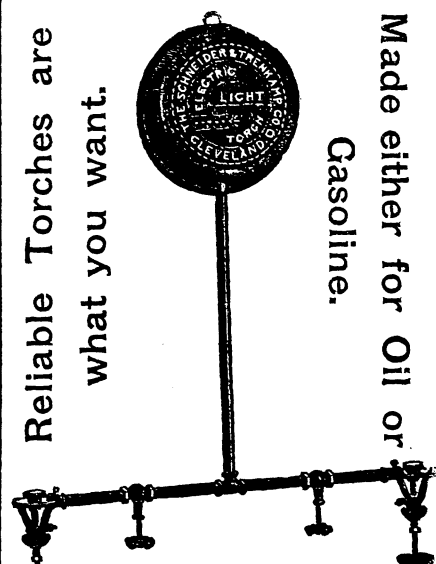


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what you want.



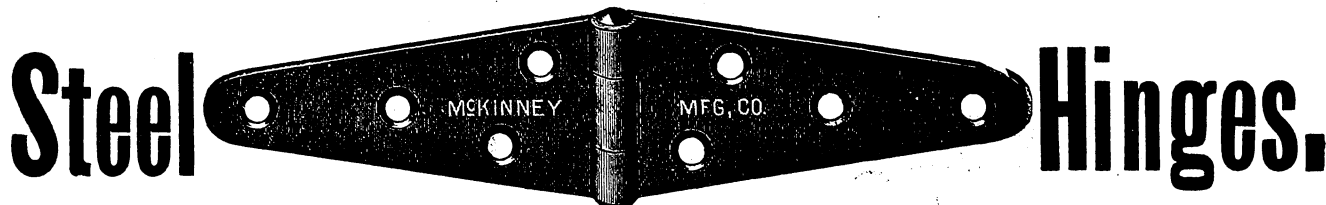
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Write us for prices. A liberal discount given to the
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THE SCHNEIDER & TRENKAMP CO.,
Nos. 479 to 497 Case Ave., Cleveland, Ohio.

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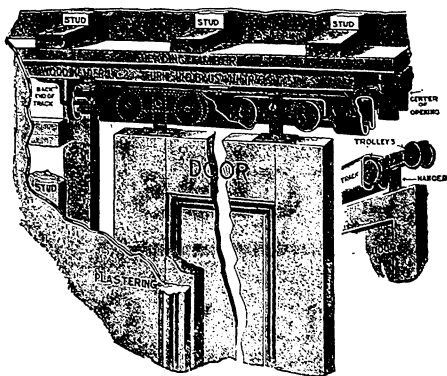
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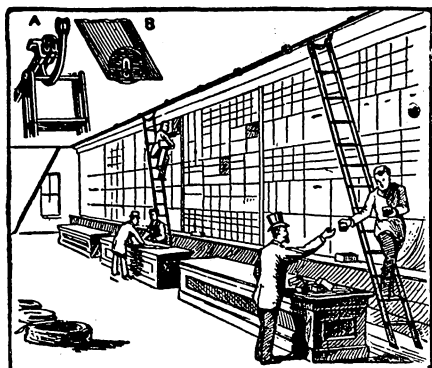
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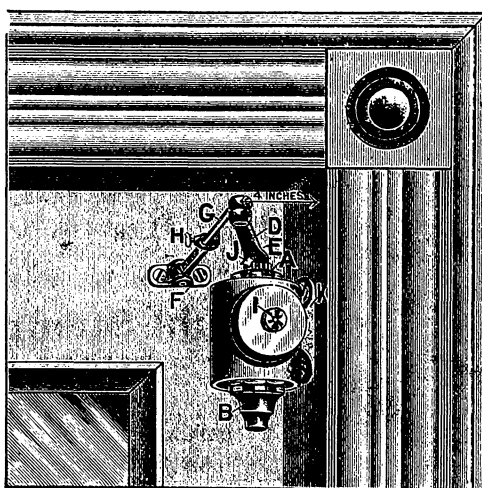
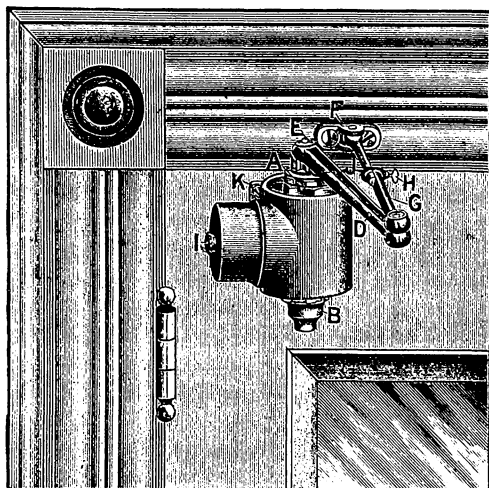
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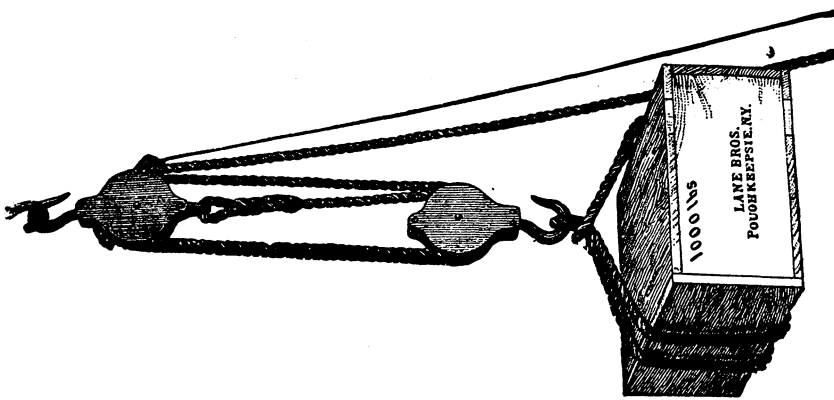


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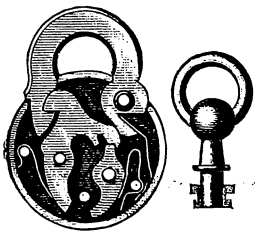
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Sizes, $\frac{1}{4}$ inch to $2\frac{1}{4}$ inches, of cast bronze. Defies competition for quality and price. No steel or iron used, cannot rust, and cannot be picked. Also, $\frac{1}{2}$ and $\frac{3}{4}$ inch Padlocks, opened with a common pin, in brass and nickel, for cats and small dogs. The best Railroad Switch and Car Lock in the world.

Adopted by the United States Treasury for bonded warehouses.

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"Champion" 6-Lever Padlock

Never before Equalled what they attained in 1892.

PRICE TALKS. QUALITY TALKS.

Sold by best Jobbers everywhere.

Every Dealer should have on File our Catalogue No. 11.

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OUR NEW FINISH.

**ANTIQUE COPPER PLATED
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Columbian Design Goods.

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NEW YORK.

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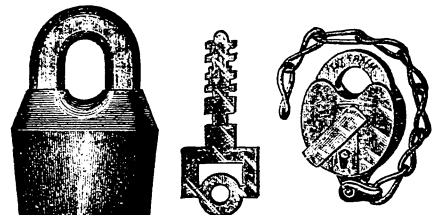
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COLBY WRINCER CO.,**

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HAVE YOU Our Price-List?

ESTABLISHED 1879.
KEYSTONE LOCK WORKS,
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EASIEST FITTED.**



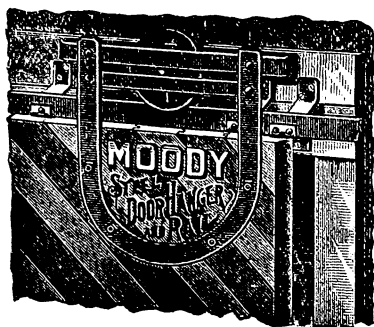
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Balance Made.**

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**STEEL ALPHABETS
STEEL NAME STAMPS
BURNING BRANDS
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Showing one-half set of hangers attached to door.

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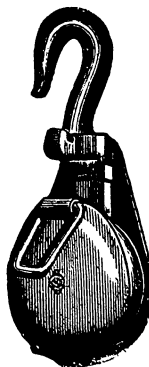


The Only Bracing Bracket Made.

HANGERS.	PRICE-LIST.	Per Doz. pr
No. 5, to run 6 feet, $3\frac{1}{4}$ in. wheel,	-	\$10.00
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RAIL, per foot.....		$6\frac{1}{2}$ cents

WHY USE WOODEN OR HEAVY STEEL BLOCKS

TACKLE BLOCKS



—MADE BY—
The Cleveland Block Co.

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ARE BETTER IN EVERY WAY.

No waste material. Every ounce of weight in the line of strength. No clumsy outside straps or bolts. As light as wooden blocks and vastly more durable. They wear, but never break. Sheaves interchangeable.

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CAN RECOMMEND THE

CHAMPION METAL WINDOW SASH CHAINS

to their customers as a reliable substitute for Sash Cords, very strong and lasting (some in daily use ten years), and gives thorough satisfaction wherever used. The patented attachments are very simple and can be applied to any window.

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"THOMAS MORTON,"

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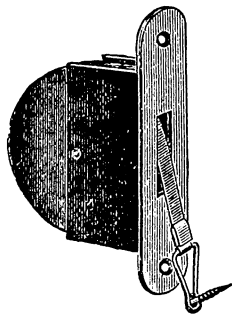
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A Well Balanced Sash

IS LIKE,

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gives satisfaction to those who are brought in contact with them. Don't be inveigled into buying anything called Sash Balances that have no record. Made from light cast iron. Ask your Hardware dealer for Pullman Steel Frame Sash Balance. Warranted 15 years. Only Steel Frame Sash Balance in the world.



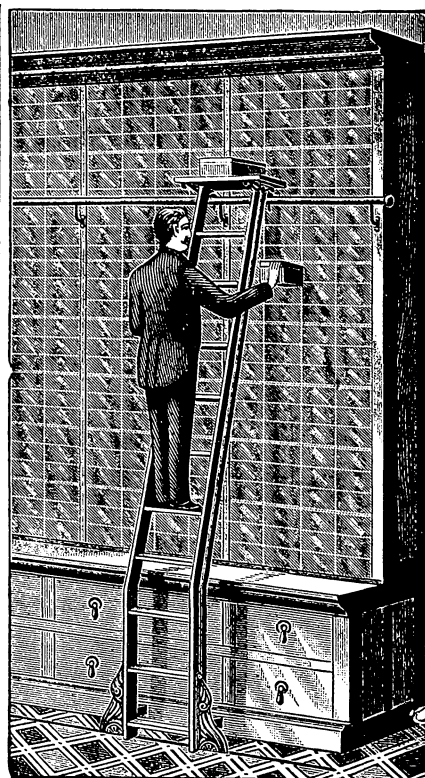
SIMPLE, CHEAP

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FLOOR TRACK BICYCLE LADDER.

No other Ladder Service can approach the "Bicycle" in ease and convenience of operation. Compared with others they work like a bicycle beside a lumber wagon.

Can be applied to any kind of shelving made. See this space next week for other styles.

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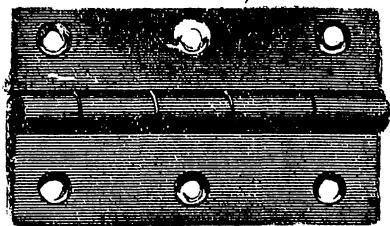
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MANUFACTURERS OF

Improved Adjustable Window Screens THE QUEEN ANNE. With box panels; the only screen made and finished alike on both sides. THE EUREKA. The best cheap extension screen on the market.

SCREEN DOORS. Finished all ready to hang Sticks, Corners, Improved Frames, &c. write for circular and Price-list.



Cast Brass Butt Hinges

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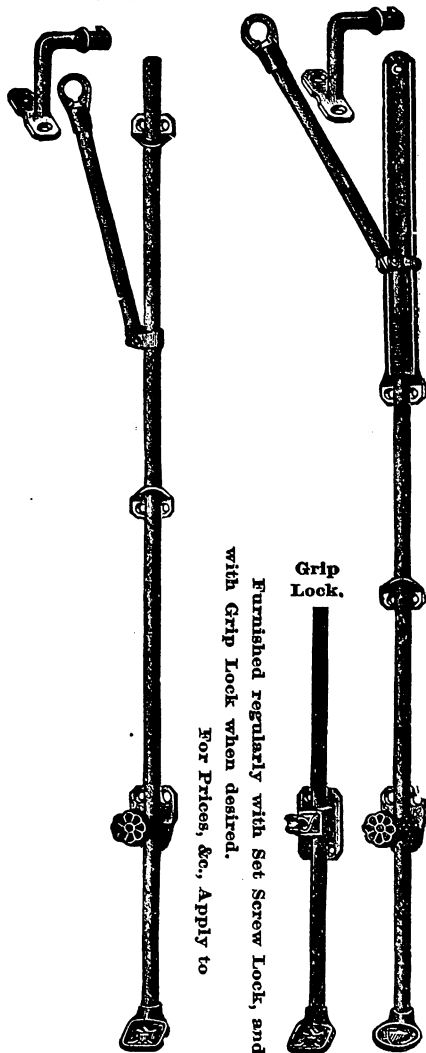
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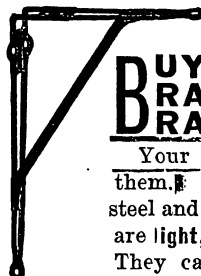
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"SHIELD."



Furnished regularly with Set Screw Lock, and with Grip Lock when desired.
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BUY BRADLEY BRACKETS!!!

Your Customers will like them. They are made of steel and are not brittle. They are light, strong and artistic. They can be put up with nail and hammer. Write for prices.

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Highest Award

FOR

Supreme Excellence

TO

The PUTNAM Hot-Forged and Hammer-Pointed Horse NAILS,



At the *World's Columbian Exposition* at Chicago. A medal and diploma worded:
"Supreme excellence in material, method in manufacture, and quality of finished product; elasticity and smoothness combined with holding power in clinch. It allows the use of very small nails."

There is nothing beyond "supreme excellence," nor is there anything comprised in a horse nail, except the "material from which it is made," "the method of manufacture," and "quality of finished product."

Putnam nails, by their "elasticity," give slightly to the expansion and contraction of the hoof while the horse is in motion; by their "smoothness," do not enlarge the nail holes in the hoof, while their "supreme excellence," in "holding power in the clinch," enables them to hold the shoe in the hardest service until worn out.

By the "use of small nails," large holes are avoided and money saved to the smith.

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All Tags and Labels on Covert Goods bear the above Trade-Mark, and are sold by all Leading Jobbers in General and Saddlery Hardware at Manufacturers' Prices.

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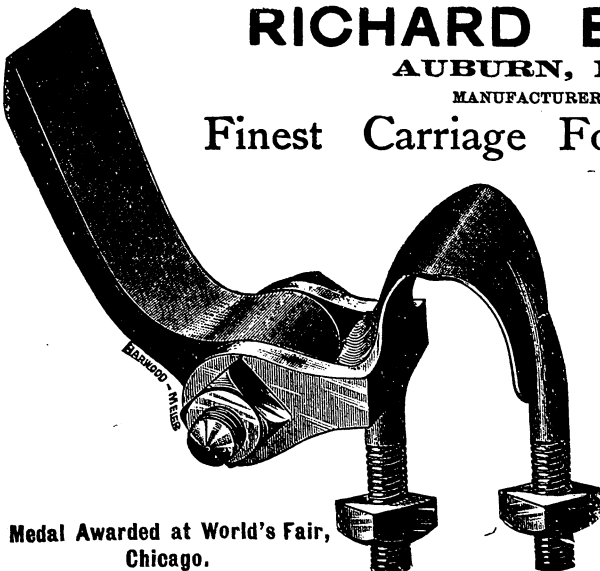
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Finest Carriage Forgings, Couplings, Clips, King Bolts, Fifth Wheels, &c. Manufacture a full line Special Drop Forgings.



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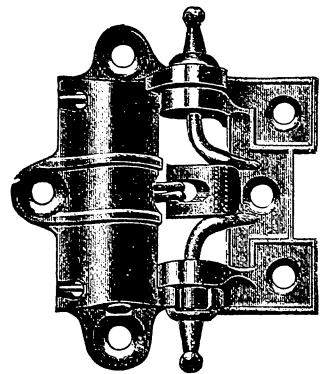
Cut One-half Size.

Sample pair sent to any hardware or saddlery firm by addressing

The Frost Thill Spring Co.,
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NEW IDEA SPRING HINGE

Holds the door strongest when closed.



Resistance gradually decreases in opening

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A covered (patented) hold-back Spring Hinge. Full particulars, free Sample and Prices by mentioning this paper.

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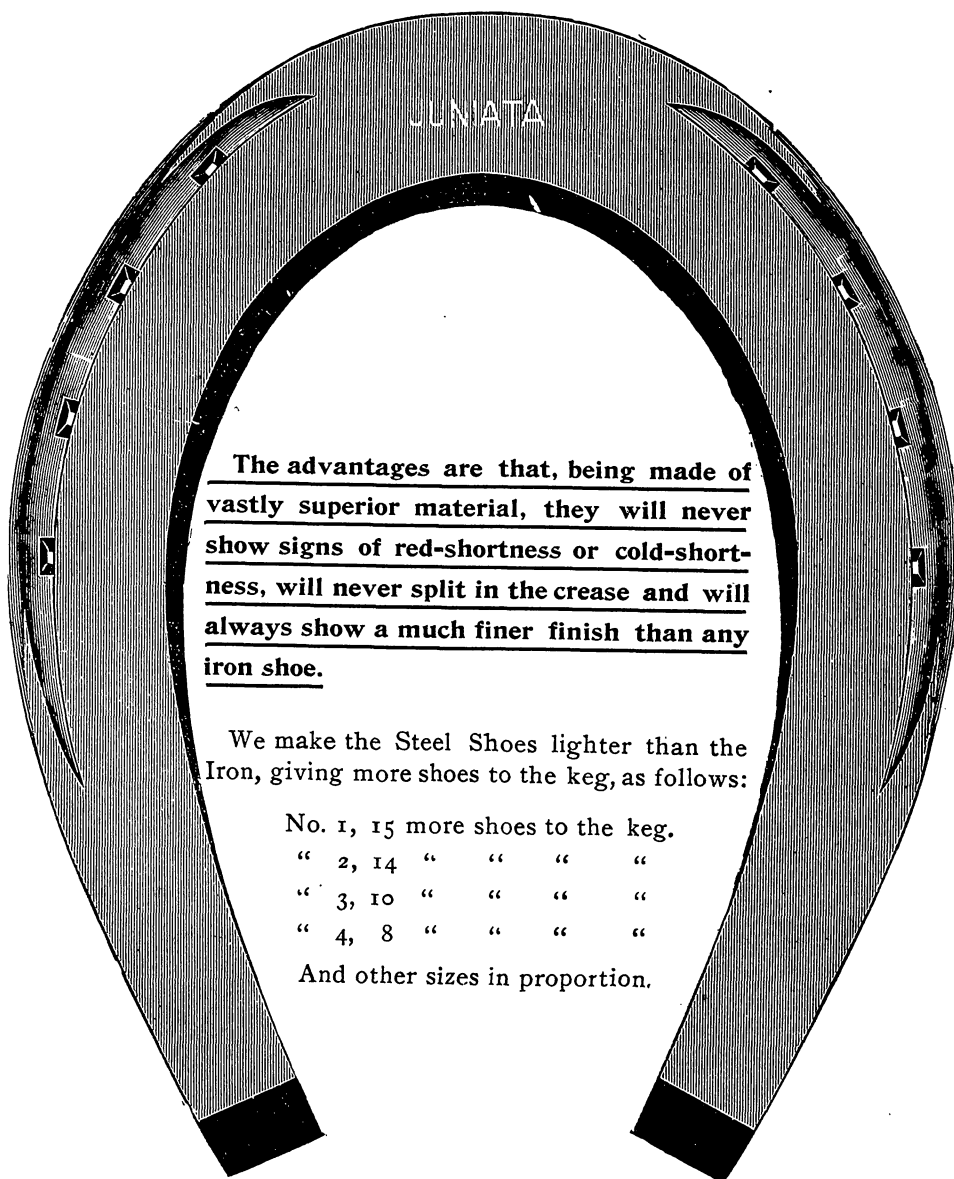
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After numerous and costly experiments have succeeded in manufacturing a special quality of soft homogeneous steel, specially adapted to the manufacture of Horse and Mule Shoes, and are now making from this steel Extra Swaged, and Government Pattern Horse and Mule Shoes. They give the best of satisfaction everywhere and we furnish them to the trade at the same prices as the regular iron shoe sold by ourselves and our competitors. We are at present making our Roadster Pattern Horse Shoes out of Iron, but we will make them of Steel also within a short time.



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We make the Steel Shoes lighter than the Iron, giving more shoes to the keg, as follows:

No. 1,	15	more shoes to the keg.
" 2,	14	" " " "
" 3,	10	" " " "
" 4,	8	" " " "

And other sizes in proportion.

No. 2 EXTRA SWAGED FRONT.

We also beg to say that we have introduced improved machinery into our new factory and have doubled our capacity, and are now prepared to furnish the best shoe, either iron or steel, ever offered to the trade.

We would also call your attention to our Improved Steel Toe Calk, equal to any in the market. To secure the best wearing qualities use sand or borax in welding on a calk and cool off at a dark red, or still better, cool off without plunging in water. We make sizes numbers 1, 2, 3, 4, 5 and 6, packed in 25-pound boxes.

Write to us for information and prices, or apply to jobbers and dealers, who sell them everywhere.

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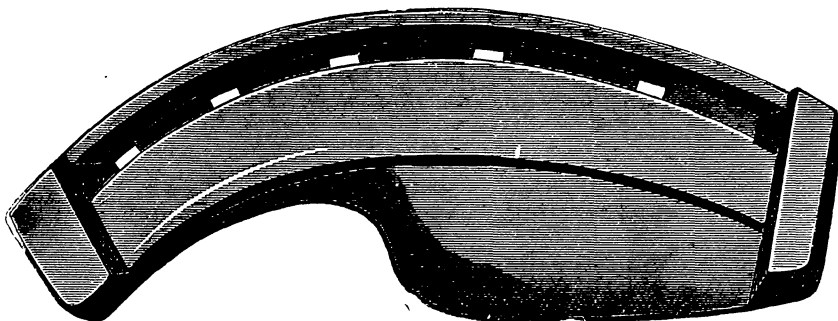
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CARRIAGE HARDWARE AND SPECIAL DROP FORGINGS.

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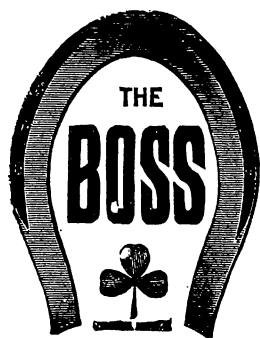
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Made under Deebie's Patent, Aug. 9, 1887.

Our 1891 pattern is a modification of the style we have made for the past four years, giving additional strength to the web.

IT IS JUST RIGHT.



HORSE AND MULE SHOES.

Superior Quality, Shape and Finish.

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MANUFACTURERS OF

Horse and Mule Shoes of the Perkins Pattern.

SPECIALTIES — X L Steel Shoes, Toe Weight Shoes and Goodenough Shoes.

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THE NEW DIAMOND STATE HORSE AND MULE SHOES.

JUST TRY THEM and YOU will say they excel all others.

MANUFACTURED BY

DIAMOND STATE IRON CO.
WILMINGTON, DELAWARE.

Other "high grade" specialties in Rivets, Spikes, Splice Bars, Track and Machine Bolts, Bank Nuts, Stay Bolt Iron, Horse Shoe Iron, Bar Iron, &c.

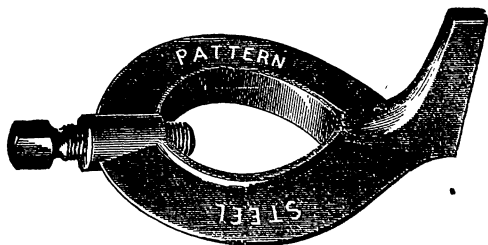
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NEW YORK OFFICE
11 Pine St.

LE COUNT'S LIGHT STEEL DOG,

WITH STEEL SCREWS.



U. S. Standard. Points Hardened.

No.	Inch.	Price.	No.	Inch.	Price.
1.....	3/8	\$0 35	7.....	1 3/4	\$1 00
2.....	1/2	35	8.....	2	1 10
3.....	3/4	60	9.....	2 1/2	1 40
4.....	1	60	10.....	3	1 50
5.....	1 1/4	75	11.....	3 1/2	1 70
6.....	1 1/2	85	12.....	4	1 90

Small set of 8, \$5.50. Full set of 12, \$12.

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"Burden Best"

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PHOENIX HORSE SHOES.

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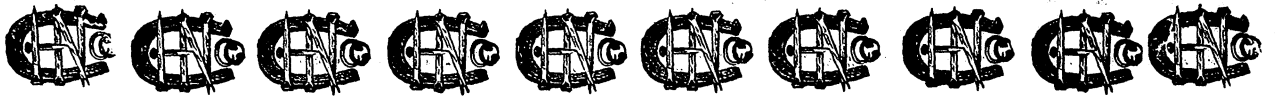
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NEW YORK OFFICE, No. 66 Reade St.

Standard Horse Shoe Co.,
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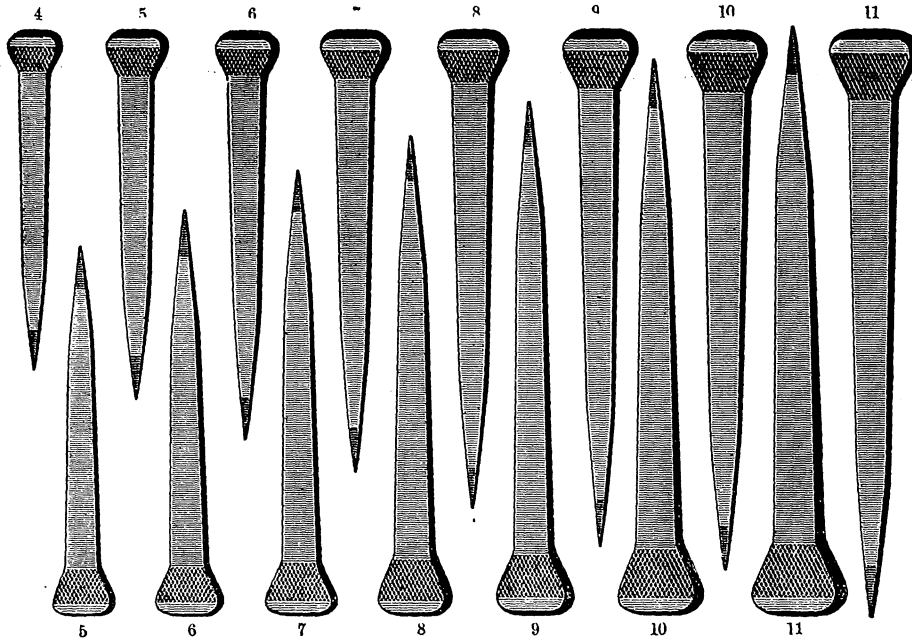
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CAPEWELL HORSE NAILS.

"Tensile strength one-half greater than that of any other nail made."

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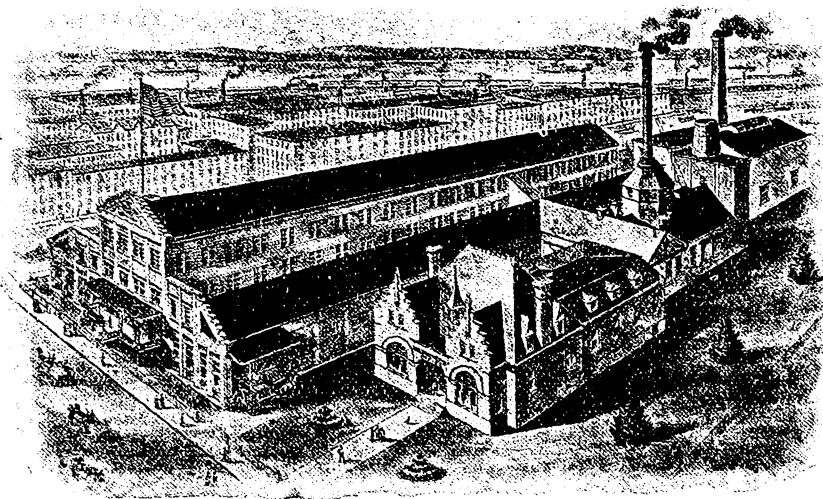
The Capewell Patent Corrugated Horse Nail.

Needs no
Clinching.



Made in
All Sizes.

"The Coming Nail to be Used."—JOHN KIERNAN,
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MANUFACTURERS OF THE BEST QUALITY

CARRIAGE MAKERS' HARDWARE,

MANUFACTURE THE LARGEST VARIETY OF

FORGED CARRIAGE IRONS

Of Best Material and Workmanship.

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Manufactured by the NATIONAL HORSE NAIL CO.,
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All Sizes. All Patterns. All Warranted. Sold Everywhere.

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Elegant Iron.

Beautiful Shape.

HORSE SHOES,
Light, Medium and Heavy.
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Light, Medium and Heavy.

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The Strongest, Lightest, Cheapest Yoke on the Market.

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BAR IRON.

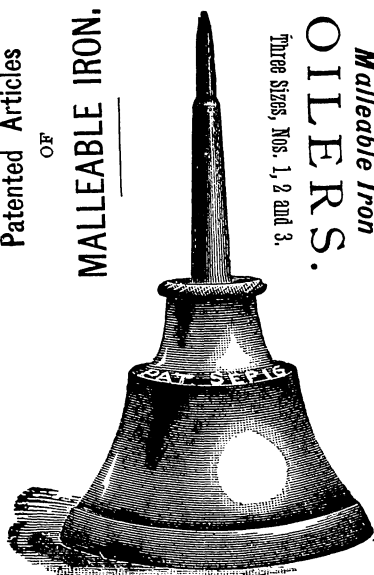
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MALLEABLE IRON.

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OILERS.
Three Sizes, Nos. 1, 2 and 3.



Hammer's Adjustable Clamps.
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New Pattern Heavy Screw Clamps.
Strongest in the market.

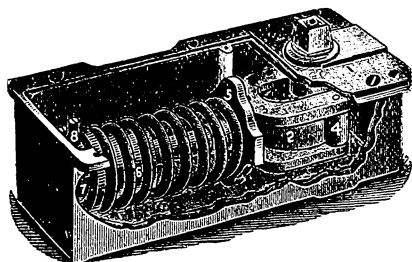
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SEND FOR PRICE LIST.
MALLEABLE IRON CASTINGS
of superior quality, and Hardware Specialties
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THE WILCOX & HOWE COMPANY,
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A Full Line of Carriage Hardware
ALSO SPECIAL FORGINGS.

Estimates cheerfully given. Send for Catalogue

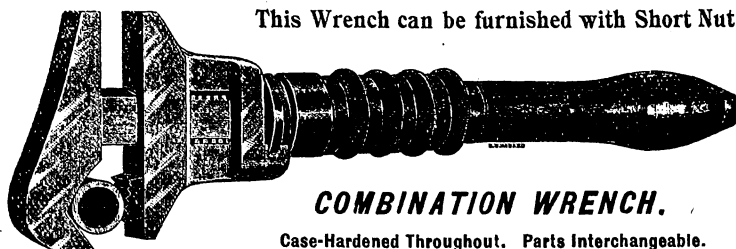


CHECKING SPRING HINGES
FOR SWING DOORS.

Applied in floor under door. They close the door gently, without noise or violence and stop it at once at the centre. Doors cannot sag, springs do not break or set.

J. BARDSLEY, 149 & 151 Baxter St., New York.

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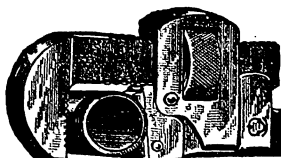
This Wrench can be furnished with Short Nut.

COMBINATION WRENCH.

Case-Hardened Throughout. Parts Interchangeable.

This wrench not only combines the superior qualities of a Gas Pipe Wrench but also all the requisite combinations of a regular Nut Wrench, thus making a combination which has no equal. For Circulars and Price-List, address

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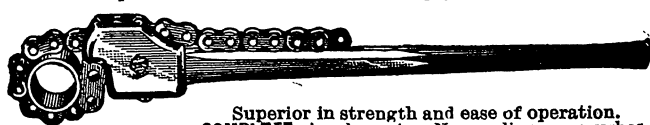
TRIMO PIPE WRENCH,

Forged Steel.

All parts interchangeable.

Grips firmly without loss of motion. Releases readily. Never locks. Causes no trouble in close quarters. Does not crush the pipe.

TRIMO
CHAIN
PIPE
WRENCH.



Superior in strength and ease of operation.
COMPLETE circular grip. Never slips nor crushes.

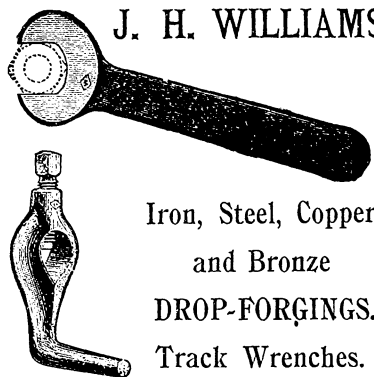
Can be used with one hand and in closer quarters than any other Basin Wrench. Parts Interchangeable.



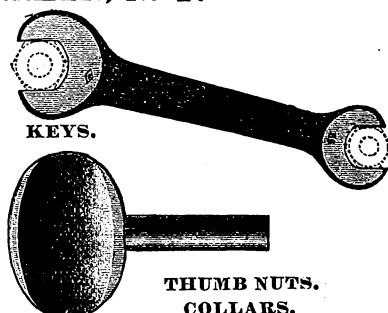
TRIMO
BASIN WRENCH.

TRIMONT MFG. CO., ROXBURY
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J. H. WILLIAMS & CO., 9-15 Richards Street,
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Iron, Steel, Copper
and Bronze
DROP-FORGINGS.
Track Wrenches.



KEYS.

THUMB NUTS.
COLLARS.

THE BILLINGS PIPE WRENCH



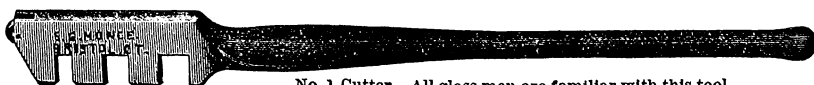
*Faw Drop Forged
from best Tool Steel
Few Parts*

*Best Workmanship
Angle of Faws the
same irrespective of
the size of pipe taken*

Length 14 inches Takes Pipe from $\frac{1}{4}$ to $1\frac{1}{2}$ inches

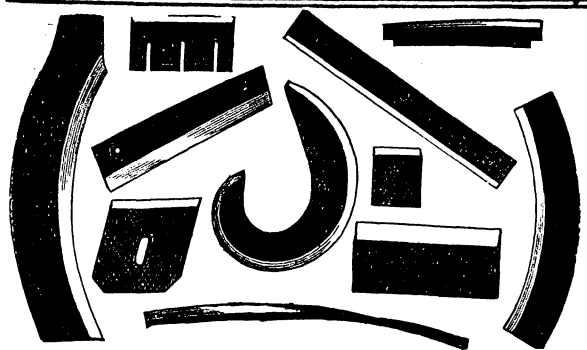
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MONCE'S NOVELTY GLASS CUTTERS. — INTERCHANGEABLE LOCK STENCILS,



No. 1 Cutter. All glass men are familiar with this tool.

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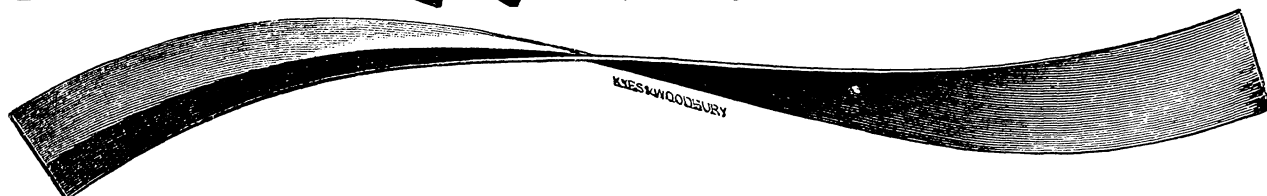
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Manufacturers of **MACHINE KNIVES.**

Shear Blades and Strips, Moulding Cutter Plate, Die Stock for Leather, Cloth and Paper Cutting Dies. Lawn Mower and Hay Cutter Knives of every description.

End view of **Plated Stock for Dies, Lawn Mower Knives, Blades** Etc., showing how the Steel is laid.



THE IMPROVED ACME STEEL WRENCH

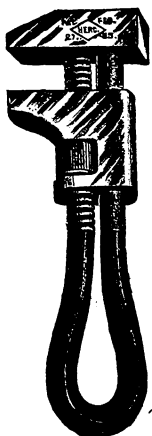
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CAPITOL MFG. CO.,

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Awarded Prize Medal at Paris Exposition and Jamaica Exposition



HERCULES.
Bright Finish.

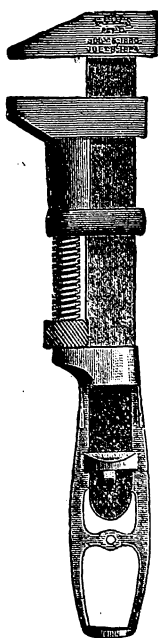


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Combination Pipe, Bolt and
Nut Wrench. Bright Finish



The Hercules Screw Driver and Tack Claw (Patented).
This Screw Driver is made from one piece of special cast steel, in all sizes, from 1 1/4 in. to 12 in. The blade is well polished, carefully tempered, and every screw driver is subjected to a severe test and warranted. Handles Japanned with the best quality baking Japan.
The Strongest and Most Durable Wrench and Screw Driver Made.
Write for Prices and Full Information.

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L. COES'

Genuine Improved
KNIFE HANDLE
PATENT

Screw Wrenches

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Established in
1839.

Registered
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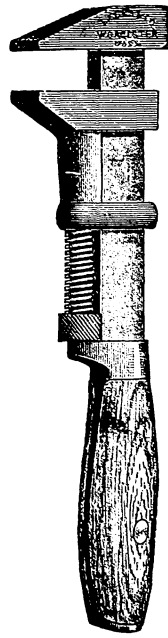
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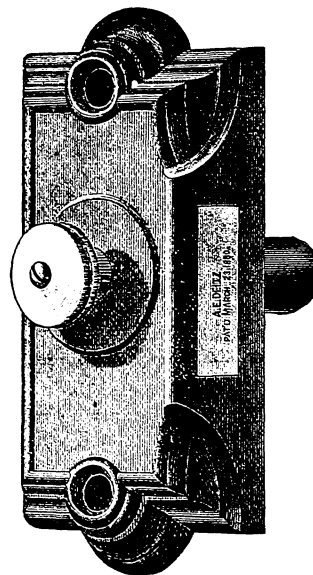
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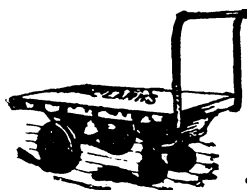
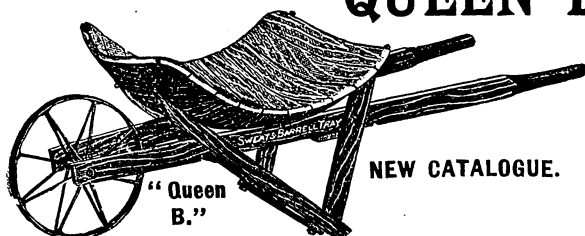


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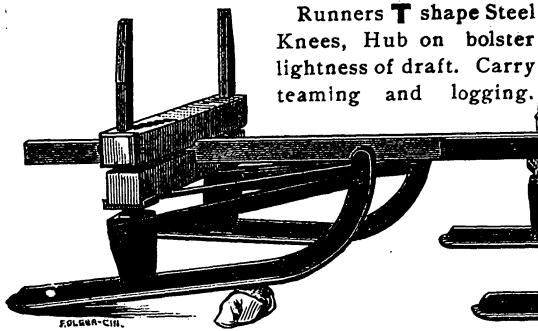
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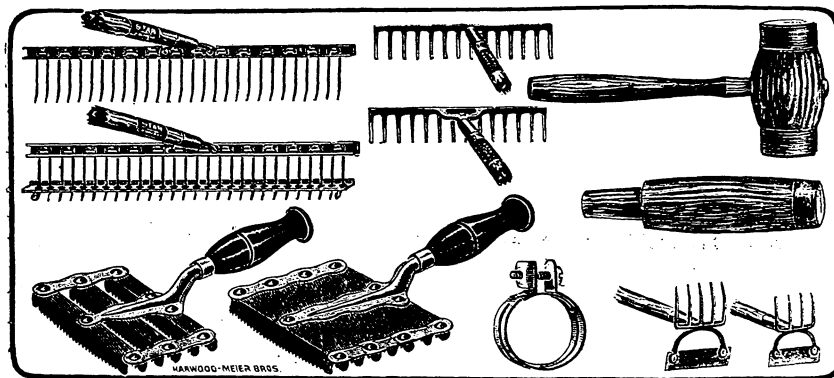
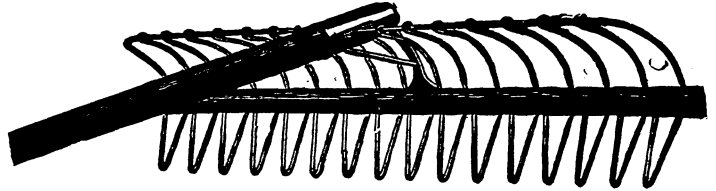
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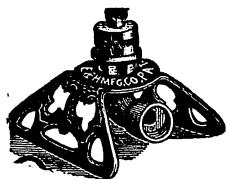
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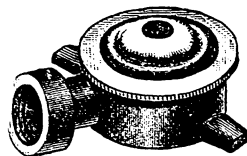


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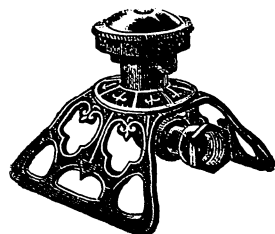
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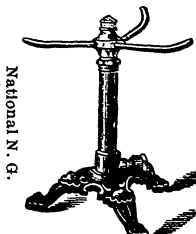


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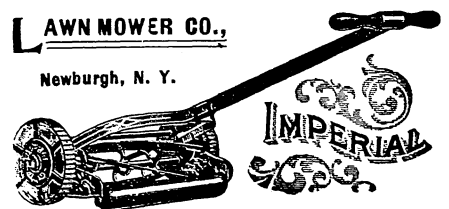


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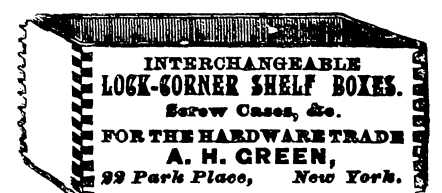
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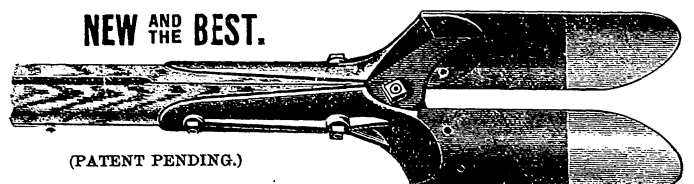
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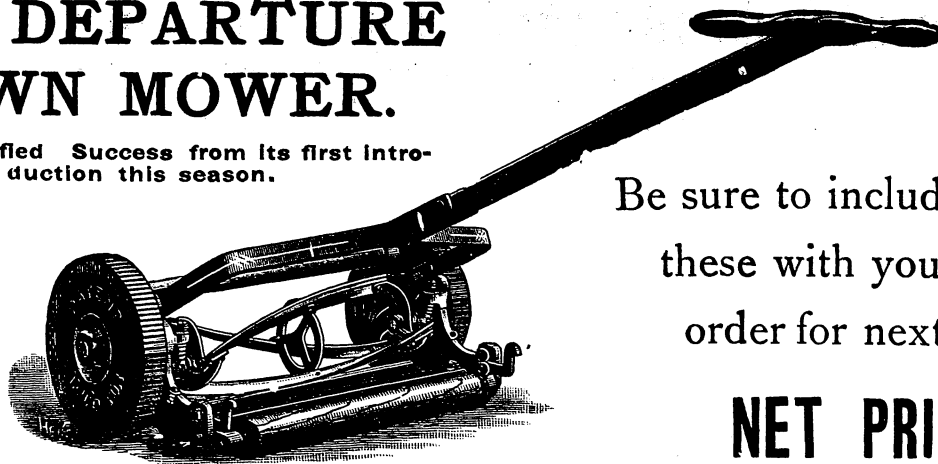
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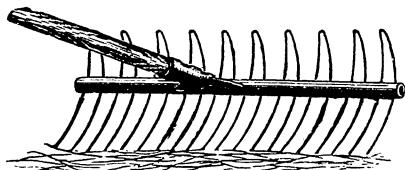
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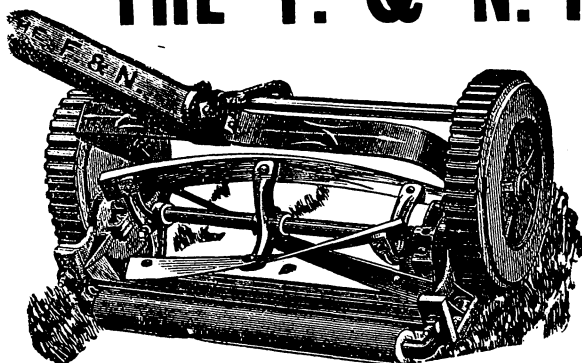
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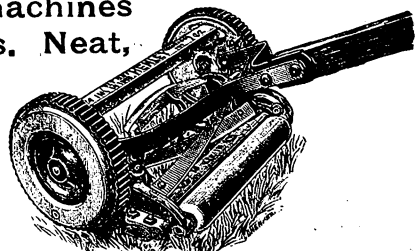
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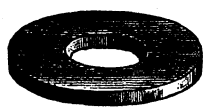
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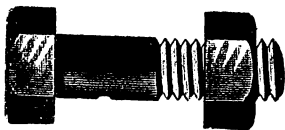
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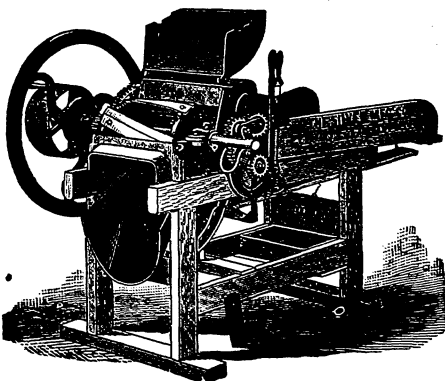
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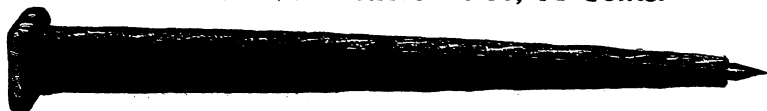
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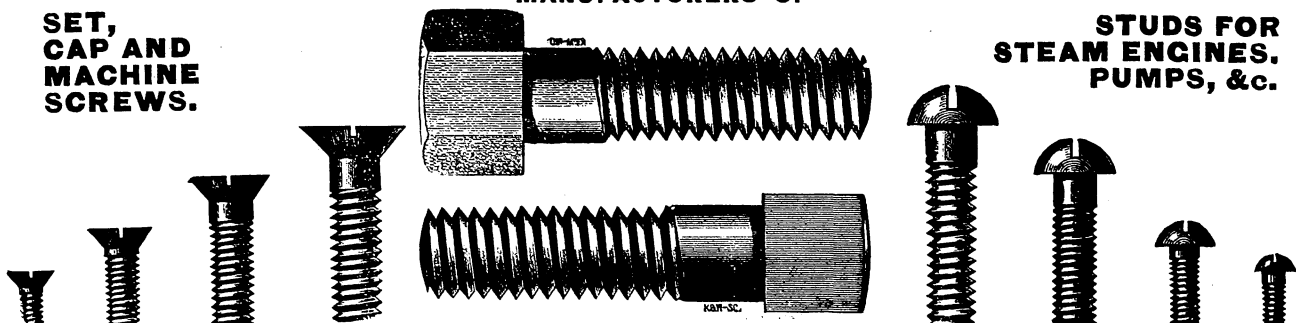


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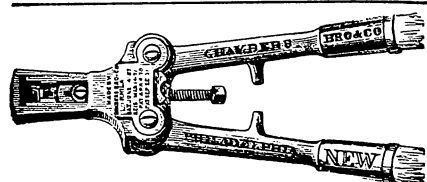
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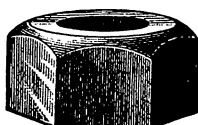
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Randolph & Clowes, Waterbury, Conn.
Seovill Mfg. Co., Waterbury, Conn.
Waterbury Brass Co., 298 B'way, N. Y.

Brass Butt Hinges.

Tiebout, W. & J., 16 & 18 Chambers,

Brass Founders.

Best, Fox & Co., Pittsburgh, Pa.
Bridgeport Deoxidized Bronze & Metal Co., Bridgeport, Conn.
Cramp, Wm. & Sons, S. & E. B. Co., Philadelphia, Pa.
Emory, P. P. Mfg. Co., Springfield, Mass.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Fram, E. T., Lancaster, Pa.
Haight & Clark, Albany, N. Y.
Keys, W. W. & R. M. Co., Bridgeport, Conn.
North Bros. Mfg. Co., Phila., Pa.
Reeves, Paul S., Philadelphia.

Brass Goods.

Brass Goods Mfg. Co., 88 Chambers,

Bridge Builders.

Berlin Iron Bridge Co., East Berlin, Ct.
Boston Bridge Works, Boston, Mass.
Wrought Iron Bridge Co., Canton, O.

Bronze (Tobin).

Ansonia Brass & Copper Co., 19-26 Cliff Street, N. Y.

Builders' Hardware.

Corbin, P. & F., New Britain, Conn.
Delta, A. E., 97 Chambers St., N. Y.
Reading Hdw. Co., Reading, Pa.
Yale & Towne Mfg. Co., Stamford, Ct.

Butchers' Steels.

Chatillon, John & Sons, 85-89 Cliff St., N. Y.
Hoffman, C. & A., Philadelphia, Pa.

Butcher and Shoe Knives, Manufacturers of.

Chatillon, John & Sons, 85-89 Cliff St., N. Y.
Gooden Co., Antrim, N. H.
Wilson, John, Sheffield, England.

Butts and Hinges.

McKinney Mfg. Co., Alleghany, Pa.
Sabin Machine Co., Montpelier, Vt.

Stanley Works, New Britain, Conn.

Tiebout, W. & J., 16 Chambers, N. Y.

Calipers and Dividers.

J. Stevens Arms and Tool Co., Chicopee Falls, Mass.
Starrett, L. S., Athol, Mass.

Can Makers' Tools and Machines.

Niagara Stamping & Tool Co., Buffalo, N. Y.

Car Axles.

Roberts, A. & P. & Co., Phila.

Carboy Stands.

Killebrand & Wolf, Philadelphia, Pa.

Car Wheels.

Whitney, A. & Sons, Phila.

Carriage Hardware, Makers of.

Cover's Saddlery Works, Farmer, N. Y.
Eccles, Richard, Auburn, N. Y.
Scranton Forging Co., Scranton, Pa.
Smith, H. D. & Co., Plantsville, Conn.
Wilcox & Howe Co., Birmingham, Conn.

Cartridge Reloading Tools.

Ideal Mfg. Co., New Haven, Conn.

Casters, Wheel, &c.

Clark, G. P., Windsor Locks, Conn.

Castings, Iron and Steel.

Ames Sword Co., Chicopee, Mass.
Arcade Malleable Iron Co., Worcester, Mass.
Booth, The Lloyd, Co., Youngstown, O.
Burgess & Loxley, Buffalo, N. Y.
The Burr & Houston Co., Brooklyn, N. Y.
Cambria Steel-Cambria Iron Co., Johnstown, Pa.
Cheney, S. & Son, Manlius, N. Y.
Chester Steel Casting Co., Phila.
Chrome Steel Works, Brooklyn, N. Y.
Dayton Malleable Iron Co., Dayton, O.
Ette & Henger Mfg. Co., St. Louis, Mo.
Eureka Cast Steel Co., Chester, Pa.
Flagg, Stanley G. & Co., Phila.
Garland Foundry Co., Cleveland, O.
Haight & Clark, Albany, N. Y.
Hammer & Co., Branford, Conn.
Herrick, J. A., 284 Pearl St., N. Y.
Johnson, I. G. & Co., Spuyten Duyvil, Pa.
Mahoning Fdy. & Mch. Co., Danville, Pa.
Falmers & De Mooy, Cleveland, O.
Seasons Foundry Co., Bristol, Conn.
Spencer's, I. S., Sons, Guilford, Conn.
Standard Fdy. & Mfg. Co., Cleveland, O.
Standard Steel Casting Co., Thurlow, Pa.
Taylor Iron & Steel Co., High Bridge, N. J.
Totten & Hogg Iron & Steel Fdy. Co., Pittsburgh, Pa.
Union Mfg. Co., 103 Chambers St., N. Y.
Wetherill, Robt. & Co., Chester, Pa.

Chains.

Bradlee & Co., Philadelphia.
Bridgeport Chain Co., Bridgeport, Conn.
Link-Belt Engineering Co., Phila., Pa.
McKay, Jas. & Co., Pittsburgh, Pa.

Chimneys.

Phila. Engineering Works, Phila., Pa.

Chisels, Manufacturers of.

Snack Bros., Millbury, Mass.
White, L. & I. J. Co., Buffalo, N. Y.

Chucks.

Cushman Chuck Co., Hartford, Conn.
Smith & Egge Mfg. Co., Bridgeport.
Union Mfg. Co., 103 Chambers, N. Y.
Whitton, D. E. Mach. Co., New London, Conn.

Clamps.

Hammer & Co., Branford, Conn.
Le Count, C. W., So. Norwalk, Conn.

Clipping Machines.

Hotchkiss, E. S., Bridgeport, Conn.
McCoy, Jos. F. & Co., 26 Warren St.

Coal.

Barns, C. K. & Co., Philadelphia, Pa.
Wister, Francis, Philadelphia, Pa.

Coke.

Barns, C. K. & Co., Philadelphia, Pa.
Houston, C. B. & Co., Philadelphia, Pa.
Rainey, W. J., Cleveland, O.
Sibell, Geo. H. & Co., Chicago, Ill.
Wister, Francis, Philadelphia, Pa.

Collections.

Hardware Board of Trade (Limited) 4 and 6 Warren, N. Y.

Condensers.

Worthington, Henry R., 86 & 88 Liberty Street, N. Y.

Conveying Machinery.

Brown Hoisting & Conveying Machine Co., Cleveland, Ohio.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Engineering Co., Phila., Pa.

Copper.

Ames Sword Co., Chicopee, Mass.
Ansonia Brass & Copper Co., 19 and 21 Cliff, N. Y.
Hendricks Bros., 49 Cliff, N. Y.
New Haven Copper Co., 294 Pearl, N. Y.
Randolph & Clowes, Waterbury, Conn.
Wister, Francis, Philadelphia, Pa.

Coppersmiths.

Emory, P. P. Mfg. Co., Springfield, Mass.

Cordage.

Samson Cordage Works, Boston, Mass.

Cork Screws.

Williamson, C. T. Wire Novelty Co. Newark, N. J.

Corrugated Furnaces.

Continental Iron Wks, Brooklyn, N. Y.

Corrugated Iron.

Cambridge Roofing Co., Cambridge, O.
Moseley Iron Bridge & Roof Co., 6 Day N. Y.

Counting Machines.

Durant, W. N., Milwaukee, Wis.
Osborn, G. Edw. & Co., New Haven, Ct.

Coupling.

Almond, T. R., Brooklyn, N. Y.

Coverings, Boiler and Pipe.

Johns, H. W. Mfg. Co., 37 Maiden Lane.

Cranes.

Detroit Foundry Equipment Co., Detroit, Mich.
Halsey, W. S. & Co., Birdsboro, Pa.
Harrington, E. Son & Co., Phila., Pa.
Maris & Beekley, Philadelphia, Pa.
Ridgway, Craig & Sons, Coatsville, Pa.
Sellers, Wm. & Co., Inc., Phila., Pa.
Yale & Towne Mfg. Co., Stamford, Conn.

Cupolas, Hot-Blast.

Colliau, Victor, Detroit, Mich.
Detroit Fdry. Equipment Co., Detroit, Mich.

Cutlery Cases.

Torrey, J. R. & Co., Worcester, Mass.

Cutlery, Importers of.

Field, Alfred & Co., 93 Chambers St., New York.
Gurney, Fred B., 116 Chambers St., N. Y.
Sickles, Sweet & Lyon, 35 Barclay, N. Y.

Cutlery, Manufacturers of.

Singham, W. Co., Cleveland, Ohio.
Dane, Stoddard & Kendall, Boston, Mass.
Electric Cutlery Co., 113 Chambers, N. Y.
Goodell Co., Antrim, N. H.
Northampton Cutlery Co., Northampton, Mass.
Schmactenberg Bros., 98 Chambers Street, N. Y.
Wilson, John, Sheffield, England.

Dampers.

Shepard, Sidney & Co., Buffalo, N. Y.

Dies.

Wilson, J. Fred, Worcester, Mass.

Die Forgings and Castings.

Bliss, E. W. Co., Brooklyn, N. Y.

Dog Collars.

Chapman Mfg. Co., Meriden, Conn.

Door Checks and Springs.

Corbin, P. & F., New Britain, Conn.

Door Knobs.

Bardsley, J., 149 & 151 Baxter St., N. Y.

Door Latches.

Graham, Jno. H. & Co., 113 Chambers St., N. Y.

Drawing Instruments.

Keuffel & Esser Co., 127 Fulton St., N. Y.

Drilling Machines.

Bickford Drill & Tool Co., Cin., Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower and Forge Co., Lancaster, Pa.
Colburn, A. M., New Haven, Conn.
Dallett, Thos. H. & Co., Philadelphia.
Dwight Lathe Machine Co., Hartford, Conn.
Halsey, Jas. T., Philadelphia, Pa.
Hamilton Mch. Tool Co., Hamilton, O.
Norton & Jones Machine Tool Works, Plainville, Conn.
Penna. Diamond Drill & Mfg. Co., Birdsboro, Pa.
Quint, A. D., Hartford, Conn.
Sellers, Wm. & Co., Inc., Phila., Pa.
Sibley & Ware, So. Bend, Ind.
Sigourney Tool Co., Hartford, Conn.
Silver Mfg. Co., Salem, O.

Drop Forgings.

Bellevue Mfg. Co., New Haven, Conn.
Billings & Spencer Co., Hartford, Conn.
Boone, W. C. Mfg. Co., Bonton, N. J.
Eccles, Richard, Auburn, N. Y.
Merrill Bros., Brooklyn, N. Y.
Miner & Peck Mfg. Co., New Haven, Ct.
Phila. Drop Forge Co., Philadelphia, Pa.
Scranton Forging Co., Scranton, Pa.
Spiers, J. C. & Co., Worcester, Mass.
Williams, J. H. & Co., Brooklyn, N. Y.
Wilmot & Hobbs Mfg. Co., Bridgeport, Conn.
Wyman & Gordon, Worcester, Mass.

Drop Presses.

Bliss, E. W. Co., Brooklyn, N. Y.
Crosby, G. A. & Co., Chicago, Ill.

See Alphabetical Index, Pages 95 & 96.

Miner & Peck Mfg. Co., New Haven, Conn.
Stiles & Parker Press Co., Brooklyn, N. Y.
Vulcan Iron Works, Chicago, Ill.
Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.

Dumb Walters.
Storm Mfg. Co., Newark, N. J.

Dust Beaters.
Peabody & Parks, Troy, N. Y.

Dynamite.
New York Powder Co., 62 Liberty St. N. Y.

Dynos.
C. & C. Electric Co., 402 and 404 Greenwich St., N. Y.
Lovell Mfg. Co., Ltd., Erie, Pa.
Zucker & Levett Chemical Co., 10 1/2 Grand St., N. Y.

Edge Tools. Makers of.
Snack Bros., Millbury, Mass.
Buffalo Edge Tool Wks., Ridgway, Pa.
Plumb, Fayette R., Philadelphia, Pa.
White, L. & I. J. Co., Buffalo, N. Y.

Edging Shears.
Dille & McGuire Mfg. Co., Richmond, Ind.

Egg Beaters.
North Bros. Mfg. Co., Philadelphia.

Electric Bells and Supplies.
Ostrandner, W. R. & Co., 204 Fulton St., New York
Wollensak, J. F., Chicago, Ill.

Electric Dynamo Machines.
Colburn Electric Mfg. Co., Fitchburg, Mass.

Elevators. Makers of.
Link-Belt Engineering Co., Phila., Pa.
Morse, Williams & Co., Phila., Pa.
Salem Fdry & Mch. Co., Salem, Mass.

Emery and Emery Wheels.
Bell, Geo. E., 36 John St., N. Y.
Grant Corundum Wheel Mfg. Co., Worcester, Mass.
N. Y. Belting & Packing Co. Ltd., N. Y.
Northampton Emery Wheel Co., Leeds, Mass.
Norton Emery Wheel Co., Worcester, Mass.
Starling Emery Wheel Co., 174 Fulton St., New York.

Enamels.
Nubian Iron Enamel Co., Cragin, Ill.

Engineers and Contractors.
Aiken Henry, Pittsburgh, Pa.
Artificial Gas Engineering Co., Pittsburgh, Pa.
Herrick, J., 284 Pearl St., N. Y.
Kennedy, Julian, Pittsburgh, Pa.
Laughlin, Alex. & Co., Pittsburgh, Pa.
Lean, D. R. Co., Pittsburgh, Pa.
McClure, Amster & Co., Pittsburgh, Pa.
Pittsburgh Iron & Steel Engineering Co., Pittsburgh, Pa.
Roberts, Frank C., Philadelphia, Pa.
Smythe, S. R. Co., Incorporated Pittsburgh, Pa.
Swindell, W. & Bros., Pittsburgh, Pa.
Wetherow, Jas. P. Co., Pittsburgh, Pa.

Engines. Gas.
Otto Gas Engine Works, Phila., Pa.
Rollason Gas Engine, Havemayer Bldg., N. Y.

Engines. Steam. Makers of.
Bass Foundry & Machine Works, Ft. Wayne, Ind.
Buckeye Engine Co., Salem, O.
Erie Engine Works, Erie, Pa.
Norwalk Iron Works Co., So. Norwalk, Conn.
Penna. Diamond Drill & Mfg. Co., Birdsboro, Pa.
Phila. Engineering Works, Phila., Pa.
Phoenix Iron Wks. Co., Meadville, Pa.
Shipman Engine Co., Boston, Mass.
Southwest Foundry and Machine Co., Phila., Pa.
Tod, William & Co., Youngstown, O.
Wetherill, Robt. & Co., Chester, Pa.

Exhaust Tumblers.
Sweater, W. A., Brockton, Mass.

Expansion Bolts.
Boone, W. C. Mfg. Co., Boonton, N. J.
Church, Isaac, Toledo, O.
Steward & Romaine Mfg. Co., Phila., Pa.

Faucets, Self-Measuring.
Lane Bros., Poughkeepsie, N. Y.

Faucets. Wooden. Makers of.
John Sommer's Son, Newark, N. J.

Feed-Water Heaters.
Davis, I. B. & Son, Hartford, Conn.
Goubert Mfg. Co., 32 Cortlandt St., N. Y.
Harrison Safety Boiler Wks., Phila., Pa.
National Pipe Bending Co., New Haven, Conn.
Webster, Warren & Co., Camden, N. J.
Whitlock Coil Pipe Co., Elmwood, Conn.

Fencing. Iron and Wire.
Barnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Clinton Wire Cloth Co., Clinton, Mass.
Gilbert & Bennett Mfg. Co., 42 Cliff St., Kilmer Mfg. Co., Newburgh, N. Y.
Mast, Foss & Co., Springfield, O.
The Van Dorn Iron Works Co., Cleveland, O.
Reliance Wire & Iron Wks., Milwaukee

Barnett, G. & H., 41 & 43 Richmond Phila.
McCaffrey File Co., Philadelphia.
Nicholson File Co., Providence R. I.

Fire Brick. Makers of.
Borgner, Cyrus, Philadelphia, Pa.
Gardner, Jas. & Son, Cumberland, Md.
Kreischer B. & Sons, 100 E. Houston, St. McLeod & Henry Co., Troy, N. Y.
Maurer, H. & Son, 420 E. 23d, N. Y.
Ostrandner Fire Brick Co., Troy, N. Y.
Valentine, M. D. & Bro., Woodbridge.

Fire Sets.
Troy Nickel Works, Troy, N. Y.

Fishing Tackle.
Dame, Stoddard & Kendall, Boston, Mass.

Flint and Emery Paper.
Baeder, Adamson & Co., Phila., Pa.

Flue Cleaners.
Mackey, Jas. T., St. Louis, Mo.

Fodder Cutters.
Silver Mfg. Co., Salem, O.

Foreign Periodicals.
Stechert, G. E., 810 Broadway, N. Y.

Forges. Portable. &c.
Bullock Bellows Co., Cleveland, O.
Buffalo Forge Co., Buffalo, N. Y.
Champion Blower & Forge Co., Lancaster, Pa.
Empire Portable Forge Co., Lansingburg, N. Y.
Sturtevant, B. F. Co., Boston, Mass.

Forgings, Iron and Steel.
Bethlehem Iron Co., S. Bethlehem, Pa.
Cambria Steel-Cambria Iron Co., Johnstown, Pa.
Frankford Steel Co., Phila. Pa.
Johnson, J. C., Scranton, Pa.
U. S. Projectile Co., Brooklyn, N. Y.

Foundry Facings.
S. Obermayer Co., Cincinnati, O.
Smith, J. D. Fdy. Supply Co., Cin., O.

Foundry Riddles.
Eatey, W. S., 65 Fulton, N. Y.

Foundry Supplies.
Colliau, Victor, Detroit, Mich.
Diamond Clamp & Flask Co., Richmond, Ind.
S. Obermayer Co., Cincinnati, O.
Smith, J. D. Fdy. Supply Co., Cin., O.

Friction Clutches.
Keystone Clutch & Mch. Wks., Phila., Pa.
Moore & White Co., Philadelphia, Pa.

Friction Cone.
Evans Friction Cone Co., Boston, Mass.

Fruit Presses.
Enterprise Mfg. Co., Philadelphia, Pa.

Gas Producers.
Wood, R. D. & Co., Philadelphia, Pa.

Gas & Steam Fitters' Supplies.
Pancoast, Henry B. & Co., Phila., Pa.

Gauge, Rolling Mill.
Haines Gauge Co., Philadelphia, Pa.

Gear Cutters.
D. E. Whiton Mach. Co., New London, Conn.

Gears.
Boston Gear Works, Boston, Mass.
Gleason Tool Co., Rochester, N. Y.
Roole, Robt. & Son Co., Baltimore, Md.
U. S. Projectiles Co., Brooklyn, N. Y.

Glass Cutters.
Monce, S. G., Bristol, Conn.

Glass Tubes.
Ashcroft Mfg. Co., 111 Liberty St., N. Y.

Glue.
Baeder, Adamson & Co., Phila., Pa.
Russa Cement Co., Gloucester, Mass.

Grass Catchers.
Supple Hardware Co., Phila., Pa.

Grinding and Polishing Machines.
Norton Emery Wheel Co., Worcester, Mass.
Washburn Shops, Worcester, Mass.

Grindstone Dressing Machinery.
Blake & Johnson, Waterbury, Conn.

Grindstones.
Cleveland Stone Co., Cleveland, O.

Gunpowder. Makers of.
Lafin & Rand Powder Co., 29 Murray St., N. Y.

Hand Carts.
Lansing Wheelbarrow Co., Lansing, Mich.

Handles.
New York Mallet and Handle Wks., 456 E. Houston St., N. Y.

Hangers. Door.
Colburn Trolley Track Mfg. Co., Holyoke, Mass.
Lane Bros., Poughkeepsie, N. Y.
Victor Mfg. Co., Newburyport, Mass.

Hardware Comm'n Merchants.
Doscher, Martin, 88 Chambers, N. Y.
Field, Alfred & Co., 93 Chambers St., N. Y.
Graham, John H. & Co., 111 Chambers St., New York.
Jacobus, W. H., 90 Chambers, N. Y.

Hardware Manufacturers.
Hotchkiss, E. S., Bridgeport, Conn.
Stearns, E. C. & Co., Syracuse, N. Y.
Union Mfg. Co., 103 Chambers, N. Y.
Yale & Towne Mfg. Co., Stamford, Conn.

Hardware Mfrs. Agents.
Bincham, W. Co., Cleveland, O.
Clarke Thomas, St. John, New Brunswick, N. Y.
Graham, John H. & Co., 113 Chambers, N. Y.
McCoy, Jos. F. Co., 26 Warren St., N. Y.
Sickles, Sweet & Lyon, 35 Barclay, N. Y.

Hardware Specialties.
Acme Shear Co., Bridgeport, Conn.
Belden Machine Co., New Haven, Conn.
Empire Portable Forge Co., Lansingburg, N. Y.
Enterprise Mfg. Co., Philadelphia, Pa.
Ette & Henger Mfg. Co., St. Louis, Mo.
Haines & Zimmerman, Phila., Pa.
Hart, R. H. Mfg. Co., Detroit, Mich.
Johnson, S. C., Racine, Wis.
Knapp & Cowles Mfg. Co., Bridgeport, Conn.
New Britain Hdw. Mfg. Co., New Britain, Conn.
North Bros. Mfg. Co., Philadelphia, Pa.
Peabody & Parks, Troy, N. Y.
Shepard, Sidney & Co., Buffalo, N. Y.
Welland, Chas., 149 Chambers St., N. Y.
Wilson, J. Fred, Worcester, Mass.

Hardware, Yacht and Ship.
Ferdinand, L. W. & Co., Boston, Mass.

Harness Snaps.
Covert Mfg. Co., West Troy, N. Y.
Cover's Saddlery Wks., Farmer, N. Y.
Fitch, W. & E. T., New Haven, Conn.

Hay Knives.
Holt, Hiram Co., E. Wilton, Me.

Holisting Machines.
Jox, Alfred & Co., 314 Green, Phila.
Johnson, Hasting & Conveying Mch. Co., Cleveland, Ohio.
Copeland & Bacon, 85 Liberty St., N. Y.
Fulton Iron & Engine Wks., Detroit, Mich.
Harrington, E. Son & Co., Phila.
Lane Bros., Poughkeepsie, N. Y.
Lidgerwood Mfg. Co., 98 Liberty, N. Y.
Maris & Beekley, Philadelphia.
Moore Mfg. & Fdy. Co., Milwaukee, Wis.
Moran, Williams & Co., Phila.
Sellers, Wm. & Co., Phila. and N. Y.
Speldel, J. G., Reading, Pa.
Yale & Towne Mfg. Co., Stamford, Ct.

Hollow Ware.
Bronson Supply Co., Cleveland, Ohio.
Cleveland Stamping & Tool Co., Cleveland, O.

Hollow Ware, Aluminum.
Illinois Pure Aluminum Co., Lemont, Ill.

Horse and Barbers' Clippers.
Hotchkiss, E. S., Bridgeport, Conn.

Horse Nails. Makers of.
Capewell Horse Nail Co., Hartford, Conn.
National Horse Nail Co., Vergennes, Vt.
Putnam Nail Co., Neponset, Boston, Mass.

Horse and Mule Shoes. Makers of.
Bryden Horse Shoe Co., Catsanauqua, Pa.
Burden Iron Co., Troy, N. Y.
Crescent Horse Shoe & Iron Co., Max Meadows, Va.
Diamond State Iron Co., Wilmington, Del.
Old Dominion Iron & Nail Works Co., Richmond, Va.
Phoenix Horse Shoe Co., Poughkeepsie, N. Y.
Rhode Island Perkins Horse Shoe Co., Providence.
Shoenberger & Co., Pittsburgh, Pa.
Standard Horse Shoe Co., Boston, Mass.

Hose.
N. Y. Belting & Packing Co., Ltd., 15 Park Row, N. Y.

Hydrants, &c.
McLean, John, 296 & 298 Monroe, N. Y.

Hydraulic Forging.
U. S. Projectile Co., Brooklyn, N. Y.

Hydraulic Jacks.
Dudgeon, Richard, 24 Columbia, N. Y.
Watson & Stillman, 24 E. 43d, N. Y.

Ice-Cream Freezers.
Clement & Dunbar, Phila., Pa.
North Bros. Mfg. Co., Phila., Pa.
Packer, C. W., Philadelphia, Pa.
White Mountain Freezer Co., Nashua, N. H.

Ice Dogs.
Waller, Geo. A., Seneca Falls, N. Y.

Injectors.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Jenkins Bros., New York

Insurance, Boiler.
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Iron and Steel, Swedish.
Lundberg, Gustaf, Boston, Mass.
Mills, A. & Co., 1 Broadway, N. Y.

Iron Commission Brokers.
Corning, Edw. & Co., 99 B'way, N. Y.
Cotton, Barclay W. & Co., Phila.
Etting, Edw. J., Philadelphia.
Hogan, John L. & Co., Philadelphia, Pa.
Hoffman, J. W. & Co., Philadelphia.
Levy, Henry & Co., Philadelphia.
Keeley, Jerome & Co., Philadelphia.
Lee, J. Tatnall & Co., Philadelphia.
Mohr, J. J., 480 Walnut, Philadelphia.
Pilling & Crane, Philadelphia, Pa.
Sibbel, Geo. H. & Co., Chicago, Ill.
Wister, L. & R. Co., Phila., Pa.

Iron Ore.
Naylor & Co., 45 Wall, N. Y.
Pulman, J. Wesley, Phila., Pa.
Samuel, Frank, Philadelphia, Pa.

Iron, Merchants.
Barnes, O. K. & Co., Philadelphia, Pa.
Borden & Lovell, 70 West, N. Y.
Busenius & Cunliffe, Philadelphia.
Corning Edw. & Co., 29 B'way, N. Y.
Cox, Justice, Jr., Philadelphia.
Cotton, Barclay W. & Co., Phila.
Hoffman, J. W. & Co., Philadelphia.
Leonard, J., 448 West St., N. Y.
Naylor & Co., 45 Wall St., N. Y.
Nicola, Wheeler & Co., Philadelphia.
Ogden & Wallace, 85 Elm St., N. Y.
Pierson & Co., 29 Broadway, N. Y.
Thomson, W. H. & Co., Phila., Pa.
Wallace, Wm. H. & Co., Albany & Washington streets, N. Y.
Whitney, A. R. & Co., 17 B'way, N. Y.
Wilson, E. H. & Co., Philadelphia.

Iron, Importers.
Abbott Wheelock & Co., N. Y. and Boston.
Lundberg, Gustaf, Boston, Mass.

Iron, Sheet. Manufacturers of.
Cambridge Iron & Steel Co., Cambridge, Ohio.
W. Dewees Wood Co., Lim., McKeesport, Pa.

Ironwork. Ornamental.
Barnum, E. T., Detroit, Mich.
Champion Iron Co., Kenton, O.
Ludlow-Saylor Wire Co., St. Louis, Mo.
Mast, Foss & Co., Springfield, O.
The Van Dorn Iron Works Co., Cleveland, O.

Keys.
Wollensak, J. F., Chicago, Ill.

Ladders, Rolling.
Colburn Trolley Track Mfg. Co., Holyoke, Mass.

Ladies.
Detroit Fdy. Equipment Co., Detroit, Mich.

Lamp Stoves.
Glazier Stove Co., Chelsea, Mich.

Lanterns.
Buhl Stamping Co., Detroit, Mich.
Steam Gauge & Lantern Co., Syracuse, N. Y.

Lathes.
Draper Machine Tool Co., Worcester, Mass.
Johnson, Israel H., Jr. & Co., Philadelphia, Pa.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.

Lathing, Wire.
Clinton Wire Cloth Co., Clinton, Mass.
N. J. Wire Cloth Co., Trenton, N. J.
Wright & Clinton Wire Cloth Co., Worcester, Mass.

Lawn Mowers.
Chadborn & Coldwell Mfg. Co., Newburgh, N. Y.
Coldwell Lawn Mower Co., Newburgh, N. Y.
Dille & McGuire Mfg. Co., Richmond, Ind.
F. N. Mfg. Co., Richmond, Ind.
Henley, M. C., Richmond, Ind.
Mast, Foss & Co., Springfield, O.
Stearns, E. C. & Co., Syracuse, N. Y.
Supple Edw. Co., Phila., Pa.

Lawn Rakes.
Gibbs Mfg. Co., Canton, Ohio.
Konler, F. E. & Co., Canton, O.
Schaeffer & Co., Dayton, Ohio.
Syracuse Specialty Mfg. Co., Syracuse, N. Y.

Lawn Sprinklers.
Ette & Henger Mfg. Co., St. Louis.
Gibbs Mfg. Co., Canton, Ohio.
McGowan, John H. Co., Cincinnati, O.

Lemon Squeezers.
Ripley Mfg. Co., U. S. 10ville, Conn.

Letters and Figures, Metallic.
White, A. A. & Co., Providence, R. I.

Letters, Paper.
Tablet & Ticket Co., Chicago, Ill.

Levels.
Davis & Cook, Watertown, N. Y.
Richardson, C. F. & Son, Athol, Mass.

Locks & Knobs. Manufacturers of.
Delta, A. E., 97 Chambers, N. Y.
Keyless Lock Co., Chicago, Ill.
Reading Hdw. Co., Reading, Pa.
Smith & Egge Mfg. Co., Bridgeport, Conn.
Yale & Towne Mfg. Co., Stamford, Conn.

Machinery.

Am. Tool Works, Cleveland, Ohio.
 Barnes, W. F. & John, Rockford, Ill.
 Sement, Miles & Co., Philadelphia, Pa.
 Bigelow, C. E., 45 Dea, N. Y.
 Bignall & Keeler Mfg. Co., St. Louis.
 Birmingham Iron Foundry, Birmingham, Conn.
 Bliss, E. W. Co., Brooklyn, N. Y.
 Bogert, Jno. L., Flushing, N. Y.
 Briggs, Marvin, 12 Broadway, N. Y.
 Carlin's Sons, Thos., Allegheny, Pa.
 Cinn. Milling Mch. Co., Cincinnati, Ohio.
 Clapp, Geo. M., agt., 74 Cortlandt, N. Y.
 Coulter & McKenzie Mch. Co., Bridgeport, Conn.
 Detrick & Harvey Mch. Co., Baltimore, Md.
 Fitchburg Mch. Works, Fitchburg, Mass.
 Garvin Mch. Co., Laight & Canal Sts.
 Gould & Eberhardt, Newark, N. J.
 Hamilton Mch. Tool Co., Hamilton, O.
 Henderson, E. Son & Co., Phila. Pa.
 Henderer, A. L., Wilmington, Del.
 Hendey Machine Co., Torrington, Ct.
 Hill, Clarke & Co., Boston, Mass.
 Johnson, Israel E., & Co., Phila.
 Jones & Lamson Mch. Co., Springfield, Vt.
 Lovegrove & Co., Philadelphia, Pa.
 McCabe, J. J., 88 Cortlandt, N. Y.
 Machinists Supply Co., Rochester, N. Y.
 Mainville, E. J. Mch. Co., Waterbury, Conn.
 Newark Mch. Tool Works, Newark, N. J.
 New Haven Mfg. Co., New Haven, Conn.
 New York Mch'y Depot, N. Y.
 Niles Tool Wks., 188 Liberty St., N. Y.
 Pittsburgh Mfg. Co., Pittsburgh, Pa.
 Place, Geo., 120 Broadway, N. Y.
 Poole, Robt. & Son Co., Baltimore, Md.
 Power, Plater Co., W., & Co., Phila.
 Pratt & Whitney Co., Hartford, Conn.
 Prentiss Tool & Supply Co., N. Y.
 Scranton Supply & Mch'y Co., Scranton, Pa.
 Sellers, Wm. & Co., Phila.
 Seyfert's Sons L. F., Philadelphia, Pa.
 Stepien, J. & Co., Cincinnati, O.
 Stow Flexible Shaft Co., Ltd., Phila.
 Toomer, Frank, Philadelphia, Pa.
 Wetherill, Robert & Co., Chester, Pa.
 Wilson, W. A., Rochester, N. Y.

Machinery for Hardware Manufacture.

Adt, Jno. & Son, New Haven, Conn.

Machine Knives.

Loring Coes & Co., Worcester, Mass.

Machine Screws.

New Britain Hdw. Mfg. Co., New Britain, Conn.

Machine Tools.—See Machinery.**Machine Work.**

Papping, J., 58th St., & 11th Ave., N. Y. City.

Machinists' Scales.

Coffin & Leighton, Syracuse, N. Y.
 Starratt, L. S., Athol, Mass.
 Valentine Tool Co., Hartford, Conn.

Machinists' Tools and Supplies.

King, J. M. & Co., Waterford, N. Y.
 Sellers, Wm. & Co., Inc., Phila.

Mallets.

N. Y. Mallet & Handle Works, N. Y.

Measuring Tapes.

Keuffel & Esser Co., 127 Fulton St., N. Y.
 Lufkin Rule Co., Saginaw, Mich.

Meat Cutters and Stuffers.

Enterprise Mfg. Co., Philadelphia, Pa.

Mechanical Instruction.

Correspondence School of Mechanics
 Scranton, Pa.

Metals.

Fearing, Wm. S., 100 Chambers, N. Y.
 Hendricks Bros., 49 Cliff, N. Y.
 Naylor & Co., 45 Wall, N. Y.

Metal Brokers.

American Metal Co., N. Y.

Metallurgists.

Britton J. Blodgett, Phila.

Milling Machines.

Cin. Milling Mch. Co., Cincinnati, Ohio.

Mining Knives.

Palmer Hdw. Mfg. Co., Troy, N. Y.

Mine Lamps.

Darby, Edw. & Sons, Phila. Pa.
 Leonard, B. E., Scranton, Pa.

Mining Screens.

Harrington & King Perforating Co.
 Chicago, Ill.
 Howard & Morse, 45 Fulton, N. Y.

Models, Makers of.

Franklin, H. H. Mfg. Co., Syracuse, N. Y.

Molding Sand.

Obermayer, S. Co., Cincinnati, O.

Motors, Water and Electric.

C. & O. Electric Co., 402 and 404
 Greenwich St., N. Y.
 Dallett, Thos. H. & Co., Phila., Pa.

Nail Machinery.

Pittsburgh Mfg. Co., Pittsburgh, Pa.

Nails (Cut) and Spikes.

Borden & Lovell, 70 West, N. Y.
 Cumberland Nail & Iron Co., Phila.
 Oxford Iron Co., 81 Washington,
 Pottstown Iron Co., Pottstown, Pa.
 Riversdale Iron Wks., Wheeling, W. Va.

Neck Yokes.

Johnson, S. C., Racine, Wis.

Nickel Platers' Supplies.

Colburn Electric Mfg. Co., Fitchburg, Mass.
 Zucker & Levett Chemical Company,
 10 to 14 Grand St., N. Y.

Norway Shapes, Rollers of.

Bowland, William & Harvey, Framford, Philadelphia

Novelty Manufacturers.

Franklin, H. H. Mfg., Syracuse, N. Y.

Nut Machines.

Dunham Nut Mch. Co., Unionville, O.

Nuts, Bolts, &c., Makers of.

American Bolt Co., Lowell, Mass.
 American Screw Co., Providence, R. I.
 Blake & Johnson, Waterbury, Conn.
 Haskell, Wm. H. Co., Pawtucket, R. I.
 Mt. Carmel Bolt Co., Mt. Carmel, Conn.
 Fort Chester Bolt and Nut Co., Chester, N. Y.
 Russell, Burdell & Ward, Port Chester, N. Y.
 Sternberg, J. B. & Son, Reading, Pa.
 Wilson, J. Fred., Worcester, Mass.
 Wm. H. Haskell Co., Pawtucket, R. I.

Oilers.

Wilnot & Hobbs Mfg. Co., Bridgeport, Conn.

Oil Stones.

Pike Mfg. Co., Pike Station, N. H.

Oil Stoves.

Glazier Stove Co., Chelsea, Mich.

Ores.

Wister, Francis, Philadelphia, Pa.

Ox Shoes.

Scranton Forging Co., Scranton, Pa.

Packing.

Morrison, Robt., St. Louis, Mo.
 N. Y. Belting & Packing Co. Ltd., N. Y.

Padilocks.

Ames Sword Co., Chicopee, Mass.
 Palm, E. T., Lancaster, Pa.
 Hillbrand & Wolf, Phila., Pa.
 Miller Lock Co., Philadelphia, Pa.

Paint.

Dixon, Jos. Crucible Co., Jersey City, N. J.

Paint Burners.

Dangler Stove & Mfg. Co., Cleveland, O.

Paint Cans.

Wilnot & Hobbs Mfg. Co., Bridgeport, Conn.

Pants Stretcher.

Covert Mfg. Co., West Troy, N. Y.

Patent Solicitors.

Howson & Howson, Phila. & Wash'ton.
 Jenner, H. W. T., Washington, D. C.
 Stocking, E. B., Washington, D. C.

Perforated Metal.

Clinton Wire Cloth Co., Clinton, Mass.
 Harrington & King Perforating Co., Chicago, Ill.
 Hendrick Mfg. Co., Ltd., Carbondale, Pa.

Phosphor Bronze.

Phosphor Bronze Smelting Co., Limited, 512 Arch, Philadelphia.

Phosphor Tin.

Orescent Phosphorized Metal Co., Philadelphia, Pa.
 Crosby Steam Gage & Valve Co., Boston, Mass.
 Haik & Naumann, 516 Pearl, N. Y.

Picks and Mattocks.

Plumb, Fayette R., Philadelphia, Pa.

Pig Iron.

Houston, C. B. & Co., Philadelphia, Pa.
 Montour Iron & Steel Co., Danville, Pa.
 Raylor & Co., 45 Wall, N. Y.
 Pilling & Crane, Philadelphia, Pa.
 Samuel, Frank, Philadelphia, Pa.

Pig Iron Storage.

Am. Pig Iron Storage Warrant Co., 44 Wall, N. Y.

Pile Drivers.

Vulcan Iron Wks., Chicago, Ill.

Pipe Bent.

National Pipe Bending Co., New Haven

Pipe Cutting and Threading Machines.

Bignall & Keeler Mfg. Co., St. Louis, Mo.
 Merrill Mfg. Co., Toledo, O.
 Pancoast Henry B. & Co., Philadelphia.
 Saunders' Sons, D., Yonkers, N. Y.

Pipe Grips.

Prentiss Vise Co., 44 Barclay, N. Y.

Pipes, Fittings, &c., Makers of.

McNab & Harlin Mfg. Co., N. Y.

Pipe, Water and Gas, Makers of.

Cumberland Nail & Iron Co., Phila. Pa.
 Donaldson Iron Co., Emaus, Pa.
 Riverside Iron Works, Wheeling, W. Va.
 Wood, R. D. & Co., Philadelphia, Pa.

Plane Irons, Manufacturers of.

Buck Bros., Millbury, Mass.

Planes, Manufacturers of.

Stanley Rule & Level Co., N. Y.

Plated Ware.

Boarman & Son, New Bedford, Ct.
 Holmes & Edwards Silver Co., Bridgeport, Conn.
 Rogers, Wm. Mfg. Co., Hartford, Ct.
 Rogers & Hamilton, Waterbury, Ct.
 Upson & Hart Co., Unionville, Ct.

Plate, Iron and Steel, Mfrs of.

Etna-Standard Iron & Steel Co., Bridgeport, O.
 Lukens Iron & Steel Co., Coatesville, Pa.

Mahoning Valley Iron Co., Youngstown, Ohio.

Gorhead-McLean Co., Pittsburgh, Pa.
 McIlvaine & Sons, Reading, Pa.
 Pottstown Iron Co., Pottstown, Pa.
 Pottsville Iron & Steel Co., Pottsville, Pa.
 Singer, Nimick & Co., Pittsburgh, Pa.
 The Mahoning Valley Iron Co., Youngstown, O.
 Wellman Iron & Steel Co., Thurlow, Pa.
 Wood Alan Co., Philadelphia.

Plating, Nickel, Brass and Silver.

Wilnot & Hobbs Mfg. Co., Bridgeport, Conn.

Pokers and Lifters.

Troy Nickel Works, Troy, N. Y.

Polishing Machines.

Watson & Stillman, 204 E. 43d, N. Y.

Polishing Wheel.

La Massena, C. E. & Co., Newark, N. J.

Post Hole Diggers.

Gibbs Mfg. Co., Canton, Ohio.
 Wister, L. & E. Co., Philadelphia, Pa.

Poultry Nettings.

Barum, E. T., Detroit, Mich.
 Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.
 N. J. Wire Cloth Co., Trenton, N. J.

Puller Finish.

Tyler Wire Wks. Co., W. S., Cleveland, O.

Wright & Colton Wire Cloth Co., Worcester, Mass.**Powder.**

Ladin & Rand Powder Co., 29 Murray
 New York Powder Co., 62 Liberty St., N. Y.

Power Hack Saws.

Millers Falls Co., 93 Reade St., N. Y.

Power Hammers.

Belden Mach. Co., New Haven, Conn.
 Diemel & Eisenhardt, Philadelphia.
 Jenkins & Linzie, Bellefonte, Pa.
 Long & Allistatter Co., Hamilton, Ohio

Presses, Dies, &c.

E. W. Bliss Co., Brooklyn, N. Y.
 Crosby, G. A. & Co., Chicago, Ill.
 Niagara Stamping and Tool Co., Buffalo, N. Y.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Stiles & Parker Press Co., Brooklyn, N. Y.
 Waterbury Mch. Co., Waterbury, Conn.

Presses, Power, Makers of.

Bliss, E. W. Co., Brooklyn, N. Y.
 Manville, E. J. Mch. Co., Waterbury, Ct.
 Merriman, A. H., Meriden.
 Niagara Stamping and Tool Co., Buffalo, N. Y.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Waterbury Farrel Foundry and Machine Co., Waterbury, Conn.

Pulleys.

Keystone Clutch Mch. Wks., Phila., Pa.
 Lake, J. H. & D. Co., Massillon, Ohio.

Pumping Machinery.

Coulter & McKenzie Mch. Co., Bridgeport, Conn.
 Dean Bros. Steam Pump Works, Indianapolis, Ind.
 Hooker-Colville Steam Pump Co., Chicago, Ill.
 McGowan, J. H. & Co., Cincinnati, O.
 Maslin, J. & Son, Jersey City, N. J.
 Norwalk Iron Wks. Co., So. Norwalk, Conn.
 Southwark Fdy. & Mch. Co., Phila., Pa.
 Valley Pump Wks., Easthampton, Mass.
 Worthington, Henry R., 86 & 88 Liberty St., N. Y.

Pumps, Makers of.

Bellevue Pump Co., Bellevue, Iowa.
 Deag Co., Salem, U.
 Douglas, W. & B., Middletown, Conn.
 Mast, Foss & Co., Springfield, O.
 Myers, F. E. & Bro., Ashland, O.

Punches and Shears, Hand and Power.

E. W. Bliss Co., Brooklyn, N. Y.
 Cockburn Barrow & Mch. Co., Jersey City, N. J.
 Crosby, G. A. & Co., Chicago, Ill.
 Henderer, A. L., Wilmington, Del.
 Long & Allistatter Co., Hamilton, Ohio.
 Niagara Stamping & Tool Co., Buffalo, N. Y.
 Stark Mch. & Tool Co., Buffalo, N. Y.
 Stiles & Parker Press Co., Brooklyn, N. Y.
 Waterbury Farrel Foundry and Mch. Co., Waterbury, Conn.
 Watson & Stillman, 204 E. 43d, N. Y.

Rails, Old and New.

Perry, W. H. & Co., Providence, R. I.

Rat and Mouse Traps.

Burditt & Williams, Boston, Mass.
 Estey, W. S., 65 Fulton, N. Y.
 Ripley Mfg. Co., Unionville, Conn.

Razors.

Electric Cutlery Co., 113 Chambers, N. Y.
 J. R. Torrey Razor Co., Worcester, Mass.

Reels.

Hendryx, A. B. Co., New Haven, Conn.

Refrigerator Door Fasteners.

Conroy, P. J. & Co., Philadelphia.

Rivets.

Blake & Johnson, Waterbury, Conn.
 Boyce Rivet Co., Muncie, Ind.
 Burden Iron Co., Troy, N. Y.
 Cobb & Drew, Plymouth, Mass.
 Henderson, Jas. S., 165 Greenwich, N. Y.
 Sternberg, J. B. & Son, Reading, Pa.
 Townsend, W. P. & Co., New Brighton, Pa.

Riveting Machines.

Adt, Jno. & Sons, New Haven, Conn.

Rock Drills.

Sand Drill Co., 23 Park Place, N. Y.

Rolling Mill Machinery.

Birmingham Iron Fdry, Birmingham, Conn.
 Booth, The Lloyd Co., Youngstown, O.
 Leachburg Foundry & Mch. Co., Pittsburgh, Pa.
 Mahoning Fdry & Mch. Co., Danville, Pa.
 Morgan Construction Co., Worcester, Mass.
 Robinson-Rea Mfg. Co., Pittsburgh.
 Totten & Hogg Iron and Steel Fdry Co., Pittsburgh, Pa.
 Trethewey Mfg. Co., Pittsburgh, Pa.
 Waterbury Farrel Foundry & Mch. Co., Waterbury, Conn.

Roll Lathes.

Totten & Hogg Iron & Steel Fdry, Co., Pittsburgh, Pa.

Rolls, Chilled, Sand and Steel.

Booth, The Lloyd Co., Youngstown, O.
 Garrison, A. Fdry Co., Pittsburgh, Pa.
 Seaman, Sleeth & Black, Pittsburgh.
 Totten & Hogg Iron and Steel Fdry Co., Pittsburgh, Pa.

Roofing.

Berlin Iron Bridge Co., E. Berlin, Conn.
 Boston Bridge Works, Boston, Mass.
 Cambridge Roofing Co., Cambridge, O.
 Johns, H. W. Mfg. Co., 87 Malden Lane

Rope and Web Goods.

Covert Mfg. Co., West Troy, N. Y.
 Covert's Saddlery Wks., Farmer, N. Y.

Rope Wheels.

Cresson, Geo. V. Co., Philadelphia, Pa.

Rubber Goods.

Canfield, H. O., Bridgeport, Conn.

Rules, Manufacturers of.

Keuffel & Esser Co., 127 Fulton St., N. Y.
 Lufkin Rule Co., Saginaw, Mich.
 Standard Tool Co., Athol, Mass.
 Stanley Rule & Level Co., 29 Chambers.

Rust Preventive.

Bridgeport Gun Implement Co., 313-315 Broadway, N. Y.

Sad Irons.

Enterprise Mfg. Co., Philadelphia, Pa.

Sand Paper.

Baeder, Adamson & Co., Phila., Pa.

Sash Balances.

Fulman Sash Balance Co., Rochester, N. Y.
 Vanderbilt Sash Balance Co., Canandaigua, N. Y.

Sash Cords and Chains.

Morton, Thos., 65 Elizabeth, N. Y.
 Osawan Mills Co., Norwich, Conn.
 Samsen Cordage Works, Boston, Mass.
 Smith & Egge, Mfg. Co., Bridgeport, Conn.
 Cincinnati Corrugating Co., Piqua, O.

Sash Locks.

Ives, H. B. & Co., New Haven, Conn.

Sash Pulleys.

Empire Portable Forge Co., Lansingburgh, N. Y.
 Palmer Hardware Mfg. Co., Troy, N. Y.

Sash Weights.

Brown, E. E. & Co., Philadelphia, Pa.

Saw Filing Machines.

Disston, Henry & Sons, Philadelphia, Pa.

Saws, Makers of.

Disston, Henry & Sons, Phila., Pa.
 Hiles, G. A. & Co., 338-338 Carroll Ave
 Chicago, Ill.
 National Saw Co., 96 Reade St., N. Y.
 Simonds Mfg. Co., Fitchburg, Mass.

Saw Sets.

Taintor Mfg. Co., 84-86 Chambers, N. Y.

Scales, Manufacturers of.

- Allentown Rolling Mill.** Allentown, Pa.
Lockhart Iron & Steel Co., Pittsburg, Pa.
Passaic Rolling Mill Co., Paterson, N.J.
Pottsville Iron & Steel Co., Pottsville, Pa.
Roberts, A. & P. & Co., Phila., Pa.
The Phoenix Iron Co., Phila., Pa.
Tudor Iron Works, St. Louis, Mo.
- Shears and Scissors.**
Acme Shear Co., Bridgeport, Conn.
Reinischs, R. Sons Co., Newark, N. J.
- Sheet Iron and Steel, Manufacturers of.**
Atma-Standard Iron and Steel Co., Bridgeport, O.
Cambridge Iron & Steel Co., Cambridge, Ohio.
Chess Bros., Pittsburg, Pa.
Maehoning Valley Iron Co., Livingston, Ohio.
Moorehead-McCleane Co., Pittsburg, Pa.
Pierson & Co., 29 Broadway, N. Y.
Singer, Nimick & Co., Pittsburg, Pa.
The Maehoning Valley Iron Co., Youngstown, O.
Alan Wood Co., Philadelphia.
W. Dewees Wood Co., McKeesport, Pa.
- Sheet Metal Work.**
Clark & Cowles, Plainville, Conn.
- Sheet Zinc.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
- Shell Brackets.**
Koch, A. B. & Co., Peoria, Ill.
- Sinks.**
Douglas, W. & B., Middletown, Conn.
- Skates, Ice.**
Barney & Berry, Springfield, Mass.
Dame, Stoddard & Kendall, Boston, Mass.
Lovell, Jno. P. Arms Co., Boston, Mass.
Sickels, Sweet & Lyon, 36 Barclay St., N. Y.
Winslow, Sam'l, Skate Mfg. Co., Worcester, Mass.
- Skates, Roller.**
Barney & Berry, Springfield, Mass.
Henley, M. C., Richmond, Ind.
Winslow, Sam'l, Skate Mfg. Co., Worcester, Mass.
- Smelting Works.**
Reeves, Paul S., 760 S. Broad, Phila.
- Soldering Coppers.**
Clendenin Bros., Baltimore, Md.
Covert Mfg. Co., West Troy, N. Y.
- Speaking Tubes.**
Ostrander, W. R. & Co., 204 Fulton St., N. Y.
Wellensak, J. F., Chicago, Ill.
- Specialties, Pat. Articles.**
Konigslow, O., Cleveland, O.
- Spelter.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
- Spoons and Forks.**
Boardman, L. & Son, New Haddam, Conn.
Holmes & Edwards Silver Co., Bridgeport, Conn.
Rogers, The Wm. Mfg. Co., Hartford, Conn.
Rogers & Hamilton Co., Waterbury, Conn.
Upson & Hart Co., Unionville, Ct.
- Sporting Goods.**
Hartley & Graham, 313-315 B'way, N. Y.
- Spring.**
Dunbar Bros., Bristol, Conn.
Miller & Van Winkle, Brooklyn, N. Y.
Morgan Spring Co., Worcester, Mass.
Roland, Wm. & Harvey, Phila., Pa.
Sabin Machine Co., Montpelier, Vt.
Tuck Mfg. Co., Brockton, Mass.
Washburn & Moen Mfg. Co., Worcester, Mass.
Wolf, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.
- Spring Hinges.**
Bardsley, J., 149 & 151 Baxter St., N. Y.
Pullman Sash Balance Co., Rochester, N. Y.
Stover Mfg. Co., Freeport, Ill.
Van Wagoner & Williams Co., 14 Warren St., N. Y.
- Stamped Ware.**
Am. Stamping Co., 104 & 106 John St., New York.
- Stamping Works.**
Cleveland Stamping & Tool Co., Cleveland, O.
- Staples.**
Cobb & Drew, Plymouth, Mass.
Titchener E. H. & Co., Binghamton, N. Y.
- Steam Gauges.**
Ashcroft Mfg. Co., 111 Liberty St., N. Y.
Bristols Mfg. Co., Waterbury, Conn.
- Steam Hammers, &c., Makers of.**
Dienelt & Eisenhardt, Philadelphia.
Dudgeon, Richard, 24 Columbia Street, N. Y.
Trethewey Mfg. Co., Pittsburg, Pa.
- Steam Heating.**
Webster Warren & Co., Camden, N. J.
- Steam Separators.**
Goubert Mfg. Co., 32 Cortland St., N. Y.
Harrison Safety Boiler Wks., Phila., Pa.
- Steel, Cold Rolled Strip.**
Willmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Steel Figures and Alphabets.**
Hoefig, C. W., 53 Fulton St., N. Y.
Howard, W., 61 Fulton St., N. Y.
Wolf, C. H., 177 William St., N. Y.
- Steel Importers.**
Abbott, Wheelock & Co., N. Y. and Boston.
Hobson, Francis, Seaman & Co., 9 John St., N. Y.
Jessop, Wm. & Sons, Sheffield, Eng. land, or 91 John, N. Y.
Maline, A. & Co., 1 Broadway, N. Y.
Newton & Shipman, 83 John, N. Y.
Wetherell Bros., 93 Liberty St., N. Y.
Whitney, A. R. & Co., B'way, N. Y.
Wolf, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.
- Steel (Mushet's Special).**
Jones, B. M. & Co., Boston.
- Steel Manufacturers.**
Atma-Standard Iron & Steel Co., Bridgeport, O.
Bethlehem Iron Co., S. Bethlehem, Pa.
Baker, Hermann & Co., 103 Duane St. Carbon Steel Co., Pittsburg, Pa.
Chester Steel Castings Co., Phila., Pa.
Chrome Steel Works, Brooklyn, N. Y.
Creuscent Steel Co., Pittsburg, Pa.
Eiken & Co., Hagen, Germany.
Frankford Steel Co., Philadelphia.
Gautier Steel Department of Cambria Iron Co., Johnstown, Pa.
Hobson, Francis, Seaman & Co., 9 John St., N. Y.
Jessop, Wm. & Sons, Sheffield, Eng. land, or 91 John, N. Y.
Kayser, Ellison & Co., Sheffield, Eng.
La Belle Steel Co., Pittsburg, Pa.
Lukens Iron & Steel Co., Coatesville, Pa.
Moorhead-McCleane Co., Pittsburg, Pa.
Moss, F. W., 83 John N. Y.
Naylor & Co., 45 Wall, N. Y.
Pottsville Iron and Steel Co., Pottsville, Pa.
Rowland, Wm. & Harvey, Frankford Philadelphia.
Singer, Nimick & Co., Pittsburg, Pa.
Stanley Works, New Britain, Conn.
Steel & Iron Improvement Co., Pittsburg, Pa.
Taylor Iron & Steel Co., High Bridge, N. J.
Wetherell Bros., 93 Liberty, N. Y.
Willmot & Hobbs Mfg. Co., Bridgeport, Conn.
- Steel, Manufacturers' Agents.**
Barnes, O. K. & Co., Philadelphia, Pa.
Corning, Edw. & Co., 29 B'way, N. Y.
Frasse Co., 19 Warren St., New York.
Lindsay, Jas. G. & Co., Phila., Pa.
Pierson & Co., 29 Broadway, N. Y.
- Steel Rails, Manufacturers of.**
Bethlehem Iron Co., S. Bethlehem, Pa.
Cambria Iron Co., Johnstown, Pa.
Montour Iron & Steel Co., Danville, Pa.
Riverside Iron Wks., Wheeling, W. Va.
- Steel, Tool.**
Frankford Steel Co., Philadelphia, Pa.
Jessop, Wm. & Sons, Sheffield, Eng. land, 91 John, N. Y.
Jones, B. M. & Co., Boston, Mass.
La Belle Steel Co., Pittsburg, Pa.
- Step Ladders.**
Bicycle Step Ladder Co., Chicago, Ill.
Croissant, M., Albany, N. Y.
- Stocks and Dies.**
Armstrong Mfg. Co., Bridgeport, Conn.
Billings & Spencer Co., Hartford, Conn.
Butterfield & Co., Derby Line, Vt.
Hart Mfg. Co., Cleveland, O.
Saunders' Sons, D., Yonkers, N. Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Stove Linings.**
Ostrander Fire Brick Co., Troy, N. Y.
- Stove Pipe Thimbles.**
Cheney, S. & Son Manlius, N. Y.
- Stove Trimmings.**
Troy Nickel Works, Troy, N. Y.
- Street Lamps.**
Steam Gauge & Lantern Co., Syracuse, N. Y.
- Strops.**
Electric Cutlery Co., 113 Chambers, N. Y.
J. R. Torrey & Co., Worcester, Mass.
- Structural Iron Work.**
Berlin Iron Bridge Co., East Berlin, Conn.
Boston Bridge Wks., Boston, Mass.
Lindsay, Jas. G. & Co., Phila., Pa.
Wrought Iron Bridge Co., Canton, O.
- Sulphuric Acid.**
Matthiessen & Hegeler Zinc Co., La Salle, Ill.
- Tacks, Brads, Staples, &c.**
Atlas Tack Corporation, Boston, Mass.
Clendenin Bros., Baltimore, Md.
Cobb & Drew, Plymouth, Mass.
Grand Crossing Tack Co., Grand Crossing, Ill.
Nat. Screw & Tack Co., Cleveland, O.
Phillips, E. & Sons, South Hanover.
Traffant, W. E., Whitman, Mass.
- Taps and Dies.**
Butterfield & Co., Derby Line, Vt.
Carpenter, J. M., Tap & Die Co., Pawtucket, R. I.
Manning, Maxwell & Moore, 111 Liberty St., N. Y.
Wells Bros. & Co., Greenfield, Mass.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Teaser Laboratories.**
Riehle Bros. Testing Mch. Co., Philadelphia.
- Testing Machines.**
Riehle Bros. Testing Mch. Co., Phila.
- Theatrical Hardware.**
Wollensak, J. F., Chicago, Ill.
- Thill Springs.**
Frost Thill Spring Co., Boston, Mass.
Sabin Machine Co., Montpelier, Vt.
- Time Record.**
Scattergood, H. W., Phila., Pa.
- Tinners' Hardware.**
Berger Bros., Philadelphia, Pa.
- Tinning Process.**
Sands, Thomas, Nashua, N. H.
- Tin Plate Machinery.**
Lloyd Booth Co., Youngtown, Ohio.
- Tinware.**
Am. Stamping Co., 104 & 106 John St., New York.
- Tire Upsetters.**
Butts & Ordway, Boston, Mass.
- Tee Calks, Steel.**
Burke, P. F., Boston, Mass.
- Tool Chests.**
Am. Tool Co., 200 W. Houston St., N. Y.
- Tools.**
Brown, R. H. & Co., New Haven, Conn.
Frasse Co., 19 Warren St., New York.
Mayhew, H. H. Co., Shelburne Falls, Mass.
Millers Falls Co., 98 Reade, N. Y.
Richardson, C. F. & Son, Athol, Mass.
Standard Tool Co., Athol, Mass.
Stanley Rule & Level Co., 29 Chambers, New York.
Starratt, L. S., Athol, Mass.
- Tools, Blacksmith and Wheelwrights.**
Buffalo Forge Co., Buffalo, N. Y.
Butts & Ordway, Boston, Mass.
Champion Blower & Forge Co., Lancaster, Pa.
Plumb, Fayette R., Philadelphia, Pa.
Wiley & Russell Mfg. Co., Greenfield, Mass.
- Tools, Steam and Gas Fitters'.**
Saunders' Sons, D., Yonkers, N. Y.
- Torches, Oil and Gasolene.**
Dangler Stove & Mfg. Co., Cleveland, O.
Schneider & Trenkamp Co., Cleveland, Ohio.
- Transom Lifters.**
Wollensak, J. F., Chicago, Ill.
- Trucks, Manufacturers of.**
Berger Bros., Philadelphia, Pa.
Clark, G. P., Windsor Locks, Conn.
Lansing Wheelbarrow Co., Lansing, Mich.
- Tubes, Seamless Drawn Copper.**
Ansonia Brass & Copper Co., 19 and 21 Cliff, N. Y.
Randolph & Clowes, Waterbury, Conn.
- Tubes, Steel.**
Ellwood Shafting & Tube Co., Ellwood City, Pa.
Leng's John S. Son & Co., 4 Fletcher St., New York.
- Tumbling Barrels.**
Henderson Bros., Waterbury, Conn.
- Turnbuckles.**
Cleveland City Forge & Iron Co., Cleveland, O.
Merrill Bros., Brooklyn, E. D.
- Twist Drills, Makers of.**
Cleveland Twist Drill Co., Cleveland, O.
Morse Twist Drill & Machine Co., New Bedford, Mass.
New Process Twist Drill Co., Taunton, Mass.
Standard Tool Co., Cleveland.
- Valves, Gas, Water and Steam.**
Best, Fox & Co., Pittsburg, Pa.
Chapman Valve Mfg. Co., Boston.
Eynon-Evans Mfg. Co., Philadelphia, Pa.
Jeanes Bros., 71 John, N. Y.
McNab & Harlin Mfg. Co., 56 John, N. Y.
Mason Regulator Co., Boston, Mass.
- Ventilator Appliances.**
Howard & Morse, 45 Fulton, N. Y.
- Vise Jaws.**
Newark Mch. Tool Co., Newark, N. J.
- Vises.**
Capital Mch. Tool Co., Auburn, N. Y.
Hollands Mfg. Co., Erie, Pa.
Howard Iron Works, Buffalo, N. Y.
Millers Falls Co., 93 Reade St., N. Y.
Prentiss Vise Co., 44 Barclay N. Y.
Van Wagoner & Williams Co., 14 Warren St., N. Y.
- Wagon Jacks.**
Covert Mfg. Co., West Troy, N. Y.
Covert's Saddlery Works, Farmer, N. Y.
- Washers.**
Haskell, Wm. H. Co., Pawtucket, R. I.
Milton Mfg. Co., Milton, Pa.
Sternbergh, J. H. & Son, Reading, Pa.
- Water Meters.**
Worthington, Henry R., 86 & 88 Liberty St., N. Y.
- Water Wheels.**
Poole, Robt. & Son Co., Baltimore, Md.
- Wheelbarrows.**
Amer. Steel Scraper Co., Sidney, Ohio.
- Cockburn Barrow & Moh. Co.,** Jersey City, N. J.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Lansing Wheelbarrow Co., Lansing, Mich.
Sidney Steel Scraper Co., Sidney, O.
Sweat Mfg. Co., Minneapolis, Minn.
- Whips.**
American Whip Co., Westfield, Mass.
- Window Cord, Makers of.**
Samson Cordage Works, Boston, Mass.
- Wire, Manufacturers of.**
Consolidated Steel & Wire Co., St. Louis, Mo.
Gautier Steel Department of Cambria Iron Co., Johnstown, Pa.
Miller & Van Winkle, Brooklyn, N. Y.
New Castle Wire Nail Co., New Castle, Pa.
New Haven Wire Mfg. Co., New Haven, Conn.
Prentiss Geo. W. & Co., Holyoke, Mass.
Salem Wire Nail Co., Salem, O.
Trenton Iron Co., Trenton, N. J.
Washburn & Moen Mfg. Co., Worcester, Mass.
Wetherell Bros., 93 Liberty St., N. Y.
Wolf, R. H. & Co., Ltd., 118th St. and Harlem River, N. Y.
Wright & Colton Wire Cloth Co., Worcester, Mass.
- Wire Cloth.**
Barnum, E. T., Detroit, Mich.
Clinton Wire Cloth Co., Clinton, Mass.
Darby, Edward & Sons, Philadelphia.
Eaton, W. & Co., 45 Fulton, N. Y.
Gilbert & Bennett Mfg. Co., 42 Cliff, N. Y.
Howard & Morse, 45 Fulton, N. Y.
N. J. Wire Cloth Co., Trenton, N. J.
Reliance Wire & Iron Wks., Milwaukee, Wis.
Scheeler & Sons, Buffalo, N. Y.
Wickwire Bros., Cortland, N. Y.
Wright & Colton Wire Cloth Co., Worcester, Mass.
W. S. Tyler Wire Works Co., Cleveland.
- Wire Cutters.**
King, J. M. & Co., Watertown, N. Y.
- Wire Dies.**
McFarland, Wm., Trenton, N. J.
Newton & Shipman, 83 John, N. Y.
- Wire Fences.—See Fencing, Iron and Wire.**
- Wire Goods, Manufacturers of.**
Darby, Edward & Sons, Phila.
Gilbert & Bennett Mfg. Co., 42 Cliff St., N. Y.
Ludlow-Saylor Wire Co., St. Louis.
Ossawa Mills Co., Norwich, Conn.
Scheeler & Sons, Buffalo, N. Y.
Wickwire Bros., Cortland, N. Y.
Williamson, C. T., Wire Novelty Co., Newark, N. J.
- Wire Machinery.**
Am. Tool Wks., Cleveland, O.
Manville, E. J. Mch. Co., Waterbury, Ct.
Morgan Construction Co., Worcester, Mass.
Waterbury Mch. Co., Waterbury, Conn.
- Wire Straightening and Cutting Machinery.**
Adt, John & Son, New Haven, Conn.
- Wire Nails.**
Consolidated Steel & Wire Co., St. Louis, Mo.
Indiana Wire Fence Co., Crawfordsville, Ind.
Kilmer Mfg. Co., Newburg, N. Y.
New Castle Wire Nail Co., New Castle, Pa.
Phillips, E. & Sons, South Hanover, Mass.
Phillips, Townsend & Co., Phila., Pa.
Salem Wire Nail Co., Salem, O.
Whitney, A. R. & Co., New York City.
- Wire Rops, Steel.**
Consolidated Steel & Wire Co., St. Louis, Mo.
New Castle Wire Nail Co., New Castle, Pa.
Washburn & Moen Mfg. Co., Worcester, Mass.
Whitney, A. R. & Co., 17 B'way, N. Y.
Wolf, R. H. & Co., Ltd., 118th Street and Harlem River, N. Y.
- Wire Rope, Iron and Steel Makers.**
Broderick & Bascom Rope Co., St. Louis, Mo.
California Wire Works, San Francisco.
Hazard Mfg. Co., Wilkesbarre, Pa.
A. Leschen & Sons Rope Co., St. Louis.
Trenton Iron Co., Trenton, N. J.
Washburn & Moen Mfg. Co., Worcester, Mass.
Williamsport Wire Rope Co., Williamsport, Pa.
- Wood-Working Machinery.**
Fay, J. A. & Egan Co., Cincinnati, O.
Seneca Falls Mfg. Co., Seneca Falls, N. Y.
- Wrenches, Manufacturers of.**
Bemis & Call Hardware & Tool Co., Springfield, Mass.
Billings, Spencer & Co., Hartford, Conn.
Capitol Mfg. Co., Chicago, Ill.
Cox Wrench Co., Worcester, Mass.
Keystone Mfg. Co., Buffalo, N. Y.
Trimont Mfg. Co., Roxbury, Mass.
Williams, J. H., Brooklyn, N. Y.
- Wringers.**
Colby Wringer Co., Montpelier.

ALPHABETICAL INDEX TO ADVERTISERS.

Abbott, Wheelock & Co.....	18	Buffalo Forge Co.....	98	Cross Pen Co.....	89	Haines Gauge Co.....	27
Acme Shear Co.....	67	Buffalo Scale Co.....	84	Crown Smelting Co.....	3	Halk & Naumann.....	3
Adt, John & Son.....	36	Buffalo Edge Tool Works.....	66	Cumberland Nail & Iron Co.....	17	Halsey, Jas. T.....	44
Atna-Standard Iron & Steel Co.....	20	Buffalo Specialty Mfg. Co.....	67	Cushman Chuck Co.....	44	Halsey, W. S. & Co.....	25
Alken, Henry.....	26	Buhl Stamping Co.....	75	Dallett, Thos. H. & Co.....	45	Hamilton Machine Tool Co.....	42
Alexander Bros.....	36	Bullock Bellows Co.....	40	Dame, Stoddard & Kendall.....	70	Hammer & Co.....	84
Allentown Rolling Mills.....	27	Burden Iron Co.....	31	Dangler Stove & Mfg. Co.....	74	Hardware Board of Trade.....	53
Almond, T. R.....	39	Burditt & Williams.....	74	Darby, Edw. & Sons.....	8	Harrington, E. Son & Co.....	46
Am. Bolt Co.....	89	Burgess & Loxley.....	98	Davis & Cook.....	58	Harrington & King Perforating Co.....	9
Am. Metal Co.....	3	Burke, P. F.....	83	Davis, I. B. & Son.....	29	Harrison Safety Boiler Wks.....	29
Am. Pig Iron & Storage Warrant Co.....	20	Burr & Houston Co.....	28	Davol, John & Sons.....	2	Hart, Henry C. Mfg. Co.....	71
Am. Screw Co.....	13	Bussenius & Cunliffe.....	52	Dayton Malleable Iron Co.....	98	Hart Mfg. Co.....	45
Am. Stamping Co.....	62	Butterfield & Co.....	44	Dean Bros. Steam Pump Works.....	35	Hartford Steam Boiler Insp. and Ins. Co.....	31
Am. Steel Scraper Co.....	86	Butts & Ordway.....	42	Deitz, A. E.....	85	Hartley & Graham.....	1
Am. Tool Co.....	73	C. & C. Electric Co.....	29	Deming Co.....	60	Haskell, Wm. H. Co.....	90
American Tool Works.....	50	California Wire Works.....	5	Detrick & Harvey Machine Co.....	47	Hazard Mfg. Co.....	6
Am. Whip Co.....	97	Cambria Iron Co.....	19	Detroit Foundry Equipment Co.....	26	Heinisch's R. Sons Co.....	67
Ames Sword Co.....	77	Cambridge Iron & Steel Co.....	23	Diamond Clamp & Flask Co.....	98	Henderer, A. L.....	41
Ansonia Brass & Copper Co.....	2	Cambridge Roofing Co.....	15	Diamond State Iron Co.....	81	Henderson Bros.....	25
Arcade File Works.....	64	Cannfield, H. O.....	37	Dienelt & Eisenhardt.....	41	Hendey Machine Co.....	56
Arcade Malleable Iron Co.....	23	Capewell Horse Nail Co.....	82	Dille & McGuire Mfg. Co.....	88	Hendricks Bros.....	2
Armstrong Mfg. Co.....	40	Capital Machine Tool Co.....	60	Disston, Henry & Sons.....	63	Hendrick Mfg. Co., Ltd.....	7
Artificial Gas Engineering Co.....	29	Capitol Mfg. Co.....	85	Dixon, Jos., Crucible Co.....	37	Hendryx, A. B. Co.....	3
Ashcroft Mfg. Co.....	33	Carbon Steel Co.....	20	Donaldson Iron Co.....	28	Henley, M. C.....	72&88
Atlas Mfg. Co.....	78	Carlin's Sons, Thomas.....	50	Doscher, Martin.....	67	Herrick, J. A.....	25
Atlas Tack Corporation.....	11	Carpenter, J. M. Tap & Die Co.....	97	Douglas, W. & B.....	60	Hertz, T. & Son.....	4
Babcock & Wilcox Co.....	34	Chadborne & Coldwell Mfg. Co.....	88	Draper Machine Tool Co.....	50	Hiles, C. A. & Co.....	62
Raeder, Adamson & Co.....	53	Chambers Bros. Co.....	90	Dudgeon, Richard.....	43	Hillebrand & Wolf.....	36
Banker & White.....	65	Champion Blower & Forge Co.....	44	Durbar Bros.....	5	Hill, Clarke & Co.....	51
Bardsley, J.....	84	Champion Iron Co.....	7	Dunham Nut Machine Co.....	42	Hobson, F., Seaman & Co.....	18
Barns, C. K. & Co.....	21	Chapman Mfg. Co.....	98	Durant, W. N.....	35	Hoefig, C. W.....	64
Barnes, W. F. & John.....	98	Chapman Valve Mfg. Co.....	32	Dwight Slate Machine Co.....	40	Hoffman, C. & A.....	66
Barnett, G. & H.....	65	Chattillon, John & Sons.....	74	Eagle Bicycle Mfg. Co.....	97	Hoffman, J. W. & Co.....	17
Barney & Berry.....	70	Cheney, S. & Son.....	23	Eccles, Richard.....	79	Hogan, John L. & Co.....	17
Barnum, E. T.....	6	Chess Bros.....	23	Edge Moor Iron Co.....	28	Hollands Mfg. Co.....	61
Bass Foundry & Machine Works.....	32	Chester Steel Casting Co.....	25	Eicken & Co.....	19	Holmes & Edwards Silver Co.....	69
Belden Machine Co.....	39	Chrome Steel Works.....	24	Electric Cutlery Co.....	68	Holt, Hiram & Co.....	89
Bell, Geo. E.....	49	Church, Isaac.....	90	Ellwood Shafting & Tube Co.....	20	Hooker-Colville Steam Pump Co.....	50
Bellevue Pump Co.....	61	Cincinnati Milling Mch. Co.....	49	Emory, P. P. Mfg. Co.....	11	Hotchkiss, E. S.....	73
Bement, Miles & Co.....	41	Claffen Mfg. Co.....	37	Enterprise Mfg. Co. of Pa.....	75	Houston, C. B. & Co.....	17
Bemis & Call Hardware & Tool Co.....	84	Clapp, Geo. M.....	51	Erie Engine Works.....	33	Howard Iron Works.....	75
Berger Bros.....	61	Clark, H. P.....	86	Estey, W. S.....	12	Howard & Morse.....	7
Berlin Iron Bridge Co.....	10	Clark & Cowles.....	6	Ette & Henger Mfg. Co.....	87	Howson & Howson.....	6
Best, Fox & Co.....	3	Clarke, Thomas.....	64	Etting, Edw. J.....	17	Ideal Mfg. Co.....	71
Bethlehem Iron Co.....	21	Clement & Dunbar.....	59	Eureka Cast Steel Co.....	98	Illinois Pure Aluminum Co.....	89
Bevin Bros. Mfg. Co.....	71	Clendenin Bros.....	12	Evans-Friction Cone Co.....	3	Indiana Wire Fence Co.....	7
Bickford Drill & Tool Co.....	46	Cleveland Block Co.....	78	Eynon-Evans Mfg. Co.....	31	Ives, H. B. & Co.....	84
Bicycle Step Ladder Co.....	78	Cleveland City Forge & Iron Co.....	1	F. & N. Mfg. Co.....	88	Jacobus, W. H.....	90
Bigelow, C. R.....	51	Cleveland Stamping & Tool Co.....	72	Fairmount Machine Co.....	47	Jarecki Mfg. Co.....	40
Bigall & Keeler Mfg. Co.....	43	Cleveland Stone Co.....	49	Fay, J. A. & Egan Co.....	46	Jeffrey Mfg. Co.....	36
Billings & Spencer Co.....	84	Cleveland Twist Drill Co.....	45	Fearing, Wm. S.....	2	Jenkins Bros.....	1
Bingham, W. Co.....	68	Clinton Wire Cloth Co.....	8	Ferdinand, L. W. & Co.....	71	Jenkins & Lingle.....	39
Birmingham Iron Foundry.....	23	Cobb & Drew.....	12	Field, Alfred & Co.....	66	Jenner, H. W. T.....	6
Bissell, E. Son & Co.....	53	Coburn Trolley Track Mfg. Co.....	76	Fitch, W. & E. T.....	97	Jessop, Wm. & Sons.....	18
Blake & Johnson.....	12	Cockburn Barrow & Machine Co.....	86	Fitchburg Machine Works.....	41	Johns, H. W. Mfg. Co.....	15
Bliss Co., E. W.....	38	Coes, Loring & Co.....	85	Fitzsimons & Co.....	17	Johnson, I. G. & Co.....	98
Boardman, L. & Son.....	69	Coes Wrench Co.....	85	Flagg, Stanley G. & Co.....	98	Johnson, I. H., Jr., & Co.....	46
Bogert, John L.....	49	Coffin & Leighton.....	49	Forehand Arms Co.....	72	Johnson, S. C.....	83
Boker, Hermann & Co.....	18	Colburn, A. M.....	44	Fraim, E. T.....	77	Jones, B. M. & Co.....	21
Boone, W. C. Mfg. Co.....	26	Colburn Electric Mfg. Co.....	29	Frankford Steel Co.....	19	Jones, Jesse & Co.....	65
Booth, The Lloyd Co.....	28	Colby Wringer Co.....	77	Franklin, H. H. Mfg. Co.....	52	Jones & Lamson Machine Co.....	56
Borden & Lovell.....	11	Coldwell Lawn Mower Co.....	87	Frasse Co.....	24	Kayser, Ellison & Co.....	18
Borgner, Cyrus.....	28	Colliau, Victor.....	29	Frost Thill Spring Co.....	79	Keeley, Jerome & Co.....	17
Boston Bridge Works.....	15	Conroy, P. J. & Co.....	62	Fulton Iron & Engine Works.....	46	Kennedy, Julian.....	26
Boston Gear Works.....	33	Consolidated Steel & Wire Co.....	14	Gardner, Jas. & Son.....	25	Keuffel & Esser Co.....	61
Box, Alfred & Co.....	44	Continental Iron Works.....	32	Garrison, A., Foundry Co.....	23	Keyless Lock Co.....	77
Boyce Rivet Co.....	98	Copeland & Bacon.....	47	Gartland Foundry Co.....	25	Keys, W. W. & R. M. Co.....	3
Bradlee & Co.....	16	Corbin, P. & F.....	76	Garvin Machine Co.....	51	Keystone Clutch & Machine Works.....	44
Brass Goods Mfg. Co.....	2	Corning, Edw. & Co.....	16	Gaudier Steel Department.....	15	Keystone Mfg. Co.....	59
Bridgeport Chain Co.....	68	Correspondence School of Mechanics.....	97	Gaylord, F. L. Co.....	3	Kilbourne & Jacobs Mfg. Co.....	86
Bridgeport De-oxidized Bronze & Metal Co.....	2	Cotton, Barclay W. & Co.....	16	Gibbs Mfg. Co.....	87	Kilmer Mfg. Co.....	7
Bridgeport Gun Implement Co.....	71	Coulter & McKenzie Machine Co.....	40	Gilbert & Bennett Mfg. Co.....	8	King, J. M. & Co.....	65
Briggs, Marvin.....	51	Covert Mfg. Co.....	79	Glazier Stove Co.....	57	Knapp & Cowles Mfg. Co.....	64
Bristols' Mfg. Co.....	1	Covert's Saddlery Works.....	57	Gleason Tool Co.....	32	Koch, A. B. & Co.....	66
Britton, J. Blodgett.....	27	Cox, Justice, Jr.....	17	Goodell Co.....	68	Kohler, F. E. & Co.....	88
Broderick & Bascom Rope Co.....	6	Cramp, Wm. & Sons S. & E. B. Co.....	3	Goubert Mfg. Co.....	34	Konigsow, Otto.....	86
Bronson Supply Co.....	74	Crescent Horse Shoe & Iron Co.....	83	Gould & Eberhardt.....	37	Kreischer, B. & Sons.....	25
Brown, E. E. & Co.....	79	Crescent Phosphorized Metal Co.....	3	Graham, John H. & Co.....	73	Krogsrud, W.....	75
Brown Hoisting & Conveying Mch. Co.....	36	Crescent Steel Co.....	20	Grant Crossing Tack Co.....	11	La Belle Steel Co.....	22
Brown, R. H. & Co.....	58	Cresson, Geo. V. Co.....	43	Grant Corundum Wheel Mfg. Co.....	49	Lafin & Rand Powder Co.....	23
Bryden Horse Shoe Co.....	81	Croissant, M.....	64	Green, A. H.....	87	Lake, J. H. & D. Co.....	48
Buck Bros.....	67	Crosby, G. A. & Co.....	39	Gurney, F. B.....	67	Lane Brothers.....	77
Buckeye Engine Co.....	82	Crosby Steam Gage & Valve Co.....	3	Haight & Clark.....	23	Lansing Wheelbarrow Co.....	86
		Cross & Speirs Machine Co.....	42	Haines & Zimmermann.....	71	Laughlin, Alex. & Co.....	26

Lea, J. Tatnall & Co.....	22	New Haven Wire Mfg. Co.....	6	Ripley Mfg. Co.....	64	Taintor Mfg. Co.....	62
Lean, D. R. Co.....	27	N. J. Wire Cloth Co.....	8	Riverside Iron Works.....	24	Tablet & Ticket Co.....	49
Le Count, C. W.....	81	New Process Twist Drill Co.....	45	Roberts, A. & P. & Co.....	19	Talcott, W. O.....	37
Leechburg Foundry & Machine Co.....	24	Newton & Shipman.....	18	Roberts, Frank C. & Co.....	26	Taylor Iron & Steel Co.....	24
Le Massena, C. E. & Co.....	49	N. Y. Belting & Packing Co.....	37	Roberts Mfg. Co.....	36	Thomson, W. H. & Co.....	17
Leng's, Jno. S. Son & Co.....	98	N. Y. Machinery Depot.....	50	Robinson-Rea Mfg. Co.....	25	Tiebout, W. & J.....	78
Leonard, B. E.....	85	N. Y. Mallet & Handle Works.....	66	Rogers & Hamilton Co.....	61	Titchener, E. H. & Co.....	7
Leonard, J.....	21	N. Y. Powder Co.....	23	Rogers, The Wm. Mfg. Co.....	69	Tod, Wm. & Co.....	32
Leschen, A. & Sons Rope Co.....	6	Niagara Stamping & Tool Co.....	40	Rollason Gas Engines.....	93	Toomey, Frank.....	51
Levis, Henry & Co.....	21	Nicholson File Co.....	65	Rowland, Wm. & Harvey.....	98	Torrey, J. R. Razor Co.....	67
Litgerwood Mfg. Co.....	98	Nicolls, Wheeler & Co.....	16	Russell, Burdall & Ward.....	98	Totten & Hogg Iron and Steel Fdry.	23
Lindsay, Jas. G. & Co.....	17	Niles Tool Works.....	51	Russia Cement Co.....	59	Co.....	23
Link-Belt Engineering Co.....	39	North Bros. Mfg. Co.....	17 & 57	St. Louis Bronze & Aluminum Works	2	Townsend, W. P. & Co.....	90
Lockhart Iron & Steel Co.....	22	Northampton Cutlery Co.....	68	Sabin Machine Co.....	4	Trenton Iron Co.....	4
Long & Allstatter Co.....	42	Northampton Emery Wheel Co.....	49	Salem Foundry & Machine Shop.....	44	Threthewey Mfg. Co.....	26
Lovell, Jno. P. Arms Co.....	71	Norton Emery Wheel Co.....	49	Salem Wire Nail Co.....	12	Trimont Mfg. Co.....	84
Lovell Mfg. Co., Ltd.....	53	Norton & Jones Machine Tool Works	36	Samson Cordage Works.....	1	Troy Nickel Works.....	67
Lovell, Tracy & Co.....	83	Norwalk Iron Works Co.....	35	Samuel, Frank.....	16	Tuck Mfg. Co.....	5
Lovegrove & Co.....	51	Nubian Iron Enamel Co.....	31	Sands, Thomas.....	55	Tudor Iron Works.....	1
Ludlow-Saylor Wire Co.....	7	Obermayer, S. Co.....	20	Saunders Sons, D.....	42	Tyler Wire Works Co. W. S.....	56
Lufkin Rule Co.....	61	Ogden & Wallace.....	21	Scattergood, H. W.....	55	Union Mfg. Co.....	48
Lukens Iron & Steel Co.....	16	Old Dominion Iron & Nail Works Co	83	Schaeffer & Co.....	87	Union Metallic Cartridge Co.....	1
Lundberg, Gustaf.....	18	Osborn, G. Edw. & Co.....	35	Scheeler & Sons.....	6	U. S. Projectile Co.....	55
McCabe, J. J.....	50	Ossawan Mills Co.....	97	Schneider & Trenkamp Co.....	75	Upson & Hart.....	69
McCaffrey File Co.....	65	Ostrander Fire Brick Co.....	25	Scott, Geo. M.....	41	Valentine, M. D. & Bro.....	28
McClure, Amsler & Co.....	26	Ostrander, W. R. & Co.....	58	Scoville Mfg. Co.....	2	Valentine Tool Co.....	39
McCoy, Jos. F. & Co.....	62	Otto Gas Engine Works.....	33	Scranton Forging Co.....	81	Valley Pump Works.....	85
McFarland, Wm.....	4	Oxford Iron & Nail Co.....	12	Scranton Supply & Machine Co.....	50	Van Dorn Iron Works Co.....	7
McGowan, J. H. & Co.....	35	Packer, C. W.....	67	Seaman, Sleeth & Black.....	23	Vanderbilt Sash Balance Co.....	77
McIlvain, Wm. & Sons.....	27	Palmer & De Mooy.....	25	Sellers, Wm. & Co.....	47	Van Wagoner & Williams Co.....	98
McKay, Jas. & Co.....	17	Palmer Hardware Mfg. Co.....	58	Seneca Falls Mfg. Co.....	46	Victor Mfg. Co.....	78
McKinney Mfg. Co.....	76	Pancoast Henry B. & Co.....	43	Sessions Foundry Co.....	25	Vulcan Iron Works.....	23
McLean, John.....	33	Passaic Rolling Mill Co.....	21	Seyfert's Sons, L. F.....	50	Wallace Wm. H. & Co.....	21
McLeod & Henry Co.....	25	Peabody & Parks.....	62	Shepard, Sidney & Co.....	74	Waller, Geo. A.....	71
McNab & Harlin Mfg. Co.....	32	Peck, A. G. & Co.....	98	Shipman Engine Co.....	33	Wardlow, S. & C.....	18
Machinists' Supply Co.....	51	Peerless Mfg. Co.....	75	Shoenberger & Co.....	80	Washburn & Moen Mfg. Co.....	4
Mackey, James T.....	33	Penna. Diamond Drill & Mfg. Co.....	33	Shultz Belting Co.....	1	Washburn Shops.....	41
Mahoning Foundry & Machine Shop.....	24	Pennsylvania Mch. Co.....	50	Sibell, Geo. H. & Co.....	51	Waterbury Brass Co.....	2
Mahoning Valley Iron Co.....	21	Perry, W. H. & Co.....	50	Sibley & Ware.....	43	Waterbury Farrel Foundry & Ma-	35
Main Belting Co.....	37	Philadelphia Drop Forge Co.....	28	Sickels, Sweet & Lyon.....	71	chine Co.....	35
Manning, Maxwell & Moore.....	45	Philadelphia Engineering Wks.....	27	Sidney Steel Scraper Co.....	87	Waterbury Machine Co.....	43
Manville Machine Co., E. J.....	55	Phillips, E. & Sons.....	11	Sigourney Tool Co.....	40	Watson & Stillman.....	42
Mansfield, H. H.....	51	Phillips, Townsend & Co.....	12	"Silver Finish".....	5	Webster, Warren & Co.....	30
Maris & Beekley.....	47	Phoenix Horseshoe Co.....	81	Silver Mfg. Co.....	89	Welland, Chas.....	53
Maslin, J. & Son.....	35	Phoenix Iron Co.....	16	Simonds Mfg. Co.....	62	Wellman Iron & Steel Co.....	16
Mason Regulator Co.....	97	Phoenix Iron Works Co.....	33	Singer, Nimick & Co.....	22	Wells Bros. & Co.....	44
Mast, Foss & Co.....	6	Phosphor Bronze Smelting Co.....	3	Smith & Egge Mfg. Co.....	43	Western Wheel Works.....	71
Matthiessen & Hegeler Zinc Co.....	2	Pierson & Co.....	20	Smith, H. D. & Co.....	83	Wetherell Bros.....	18
Maurer, H. & Son.....	25	Pike Mfg. Co.....	60	Smith, J. D. Foundry Supply Co.....	25	Wetherhill, Robt. & Co.....	97
Mayhew, H. H. Co.....	61	Pilling & Crane.....	17	Smith, Lyon & Field.....	69	White, A. A. & Co.....	75
Merrill Bros.....	17	Pittsburgh I. & S. Eng. Co.....	27	Smythe, S. R. Co., Inc.....	26	White, L. & I. J. Co.....	67
Merrill Mfg. Co.....	42	Pittsburgh Mfg. Co.....	41	Sommer's Son, John.....	98	White Mt. Freezer Co.....	57
Merriman, A. B.....	43	Pittsburgh Reduction Co.....	56	Southwark Foundry & Machine Co.....	33	Whitlock Coll Pipe Co.....	31
Miles, F. S.....	4	Place, Geo.....	50	Speidel, J. G.....	47	Whitney, A. R. & Co.....	20
Miller & Van Winkle.....	4	Plumb, Fayette R.....	68	Speirs, J. C. & Co.....	23	Whitney, A. & Sons.....	21
Miller Lock Co.....	77	Plume & Atwood Mfg. Co.....	2	Spencer's I. S. Sons.....	23	Whitton, D. E. Mch. Co.....	44
Millers Falls Co.....	58 & 98	Pollock, W. B. & Co.....	32	Standard Fdry. & Mfg. Co.....	21	Wickwire Bros.....	7
Milne, A. & Co.....	19	Poole, Robt. & Son Co.....	84	Standard Horse Shoe Co.....	81	Wilcox & Howe Co.....	84
Milton Mfg. Co.....	89	Pope Mfg. Co.....	57	Standard Steel Casting Co.....	98	Wiley & Russell Mfg. Co.....	48 & 98
Miner & Peck Mfg. Co.....	40	Popping, J.....	55	Standard Tool Co.....	45	Williams, J. H. & Co.....	84
Mohr, J. J.....	17	Port Chester Bolt & Nut Co.....	90	Standard Tool Co.....	59	Williamson, C. T. Wire Nov. Co.....	97
Monce, S. G.....	84	Pottstown Iron Co.....	19	Stanley Rule & Level Co.....	67	Williamsport Wire Rope Co.....	6
Montour Iron & Steel Co.....	21	Pottsville Iron & Steel Co.....	16	Stanley Works.....	67	Wilmot & Hobbs Mfg. Co.....	1 & 98
Moore, Dr. Gideon E.....	56	Powell Planer Co.....	41	Stark Mch. & Tool Co.....	39	Wilson, E. H. & Co.....	17
Moore Mfg. & Foundry Co.....	47	Pratt & Whitney Co.....	48	Starrett, L. S.....	61	Wilson, John.....	66
Moore & White Co.....	36	Prentiss, Geo. W. & Co.....	6	Steam Gauge & Lantern Co.....	74	Wilson, J. Fred.....	89
Moorhead-McCleave Co.....	22	Prentiss Tool & Supply Co.....	50	Stearns, E. C. & Co.....	56	Wilson, W. A.....	41
Morgan Construction Co.....	4	Prentiss Vise Co.....	60	Stechert, G. E.....	55	Winslow, Sm'l, Skate Mfg. Co.....	70
Morgan Spring Co.....	4	Pullman, J. Wesley.....	22	Steel & Iron Improvement Co.....	56	Wister, Francis.....	17
Morrison, Robert.....	33	Pullman Sash Balance Co.....	78	Steptoe, J. & Co.....	53	Wister, L. & R. & Co.....	21
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Morton, Thos.....	78	Quint, A. D.....	43	Stevens Arms & Tool Co.....	73	Wolff, C. H.....	77
Moseley Iron Bridge & Roof Co.....	7	Rainey, W. J.....	1	Steward & Romaine Mfg. Co., Ltd.....	89	Wolff, R. H. & Co. Ltd.....	5
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Myers, F. E. & Bro.....	70	Randolph & Clowes.....	1	Stocking, E. B.....	6	Wood Alan & Co.....	17
National Horse Nail Co.....	83	Read, Wm. & Sons.....	97	Storm Mfg. Co.....	60	Wood, R. D. & Co.....	28
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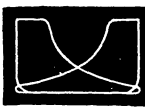


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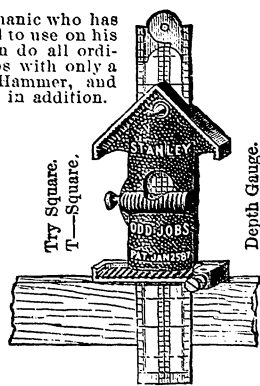
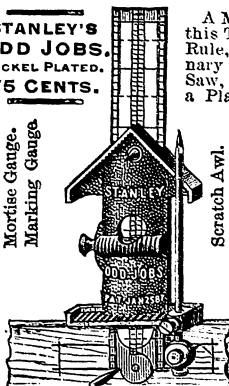
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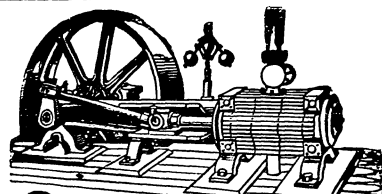
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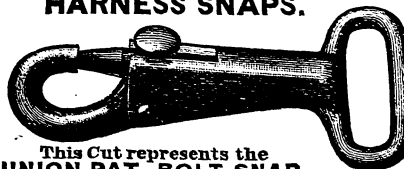
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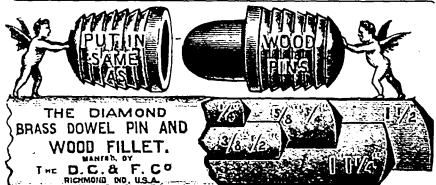
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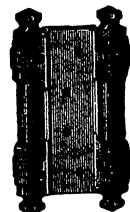
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THE IRON AGE

THURSDAY, DECEMBER 14, 1893.

The Bliss Double Spindle Milling Machine.

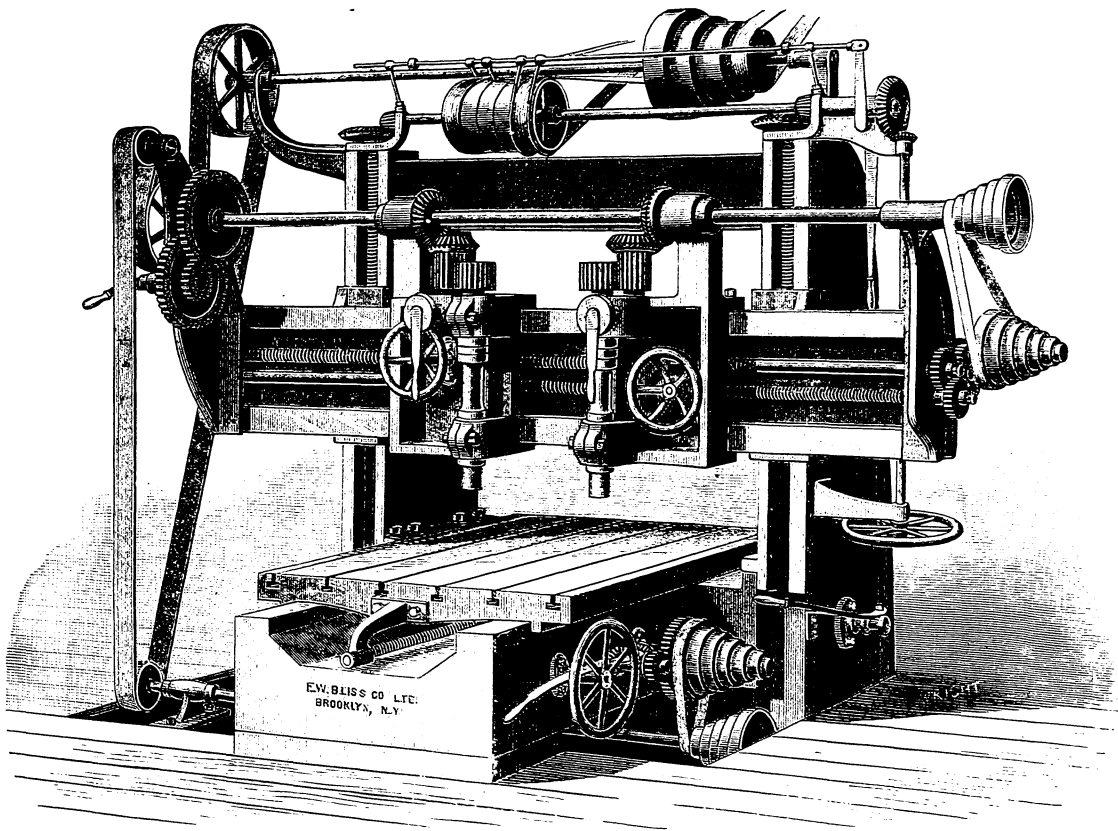
The engraving on this page represents a modification of the standard double spindle milling machine built by the E. W. Bliss Company of Brooklyn, N. Y., for the J. L. Mott Iron Works of New York. The work which the machine was particularly intended to do was the facing of each surface of the several sections forming the steam heater built by the Mott Company. Their heaters consist of rectangular sections, placed one above the other and bolted together. It is of

Each spindle is carried in a separate saddle with independent lateral motion, actuated by either hand or power feed. The power feed has six changes of speed. The hand feed is manipulated by means of the wheels shown on the saddles. It is independent of the power feed, so that the saddles can be moved in any desirable way while the power feed is in operation. The cross head is made of sufficient length to permit of running the saddles out far enough to bring the milling cutters outside of the housings.

The milling cutters can be run at eight different speeds in the machine illustrated.

there is consequent saving in labor cost. It is claimed that the furnace is economical in construction and maintenance. The design is adaptable for using various kinds of fuel, such as coal, natural gas, crude oil or fuel gas. A. Beard, Cambridge, Ohio, is the inventor.

Two important omissions have been noticed in the estimates from the State and Agricultural Departments, as presented to Congress. These are the \$30 000 usually appropriated for the Bureau of American Republics, and the sum of \$720,000, which has been allotted yearly since 1888, for the main-



THE BLISS DOUBLE SPINDLE MILLING MACHINE.

the utmost importance to have the meeting surfaces true, as the apparatus is intended to be run under pressure.

The general arrangement of the machine is like that of a planer, but in place of the ordinary planer heads it carries two vertical spindles for butt milling.

The longitudinal travel of the table is effected by means of a screw, which may be operated by hand or power in either direction. This table feed has six changes of speed (for each cutter speed), besides a power "rapid transit" motion to run the table in either direction. The quick motion is especially intended for running the table back after the cut is finished. It is entirely independent of the regular feed, and either can be operated without stopping the other.

The cross head is raised and lowered by power, in addition to which each spindle has an independent vertical adjustment of 2 inches.

The principal dimensions of the machine are: Length of table, 48 inches; width of table, 30 inches; width between housings, 54 inches; smallest obtainable distance between spindle centers, 8 inches; vertical adjustment of cross head, 24 inches; floor space over all, 9 x 12 feet; height over all, 9 feet; weight, 15,000 pounds.

Novel Annealing Furnace for Tin Mills.—A radical departure from old established methods is made in the design of an annealing furnace recently invented for the purpose of annealing small sheets of steel used in making tin plates. The old practice of charging and drawing boxes through doors at the side of the furnace is abandoned, the furnace being built vertically and charged in that manner. By a simple arrangement annealing boxes, together with their bottom plates and content, are easily handled by two men, manual labor is largely dispensed with, and

tenance of 48 agricultural experimental stations, one for each State and territory of the Union. It is inferred that these institutions are to be abolished, or at least that they are to cease being maintained by the country.

The World's Columbian Exposition has been sued for \$25,000 damages in the United States Circuit Court, at Chicago, by the Yale & Towne Mfg. Company, William Sellers & Co., the Morgan Engineering Company and the Edgemoor Bridge Works. The plaintiffs together entered into a contract with the World's Fair to construct three big electric cranes which were among the sights in Machinery Hall. They allege that the World's Fair failed to furnish sufficient power for one of the cranes and that the electric machinery was damaged by rain and snow which came through the roof of the building.

Management of Men and Workshops.

THIRD PAPER.

General and Detail Duties in Conducting Manufacture.

BY THOS. D. WEST.

In conducting manufacture with concerns requiring a general manager with superintendents or assistants under him it often becomes a question with the former where his labors will end and the latter's commence. The division of official duties in any manufacturing concern is a very important element to properly adjust. The duties of each should be so clearly defined that should anything go wrong with work as it progressed, or the finished product be found at fault the hand of the general manager could at once be laid upon the assistant responsible.

To insure perfection in any line of manufacture this point must be rigidly enforced. The line must be drawn so fine that no possible doubt as to the one responsible should exist, for if for a moment an opening is left for one head of a department to wedge in upon another and by interference and conflict of authority cause confusion, just so soon may ill results be expected.

It is the general manager's duty to plan and set off in sections or departments the manufacture of the firm's product so that as it progresses it will be under the charge of men who are fully qualified to watch and govern every detail in the process of its manufacture.

The detail work for any line of manufacture is more or less a factor that must be closely watched to accomplish success. The superintendent or assistant can in most cases be an incessant worker, and then, with all his efforts, he may often find that things go wrong and mistakes are made. It is not necessary, in order to exhibit interest and press forward work to the most successful end, that he should run around browbeating and asserting his authority at every opportunity. Some of the most successful superintendents and assistants to be found are men who, when seen at their posts of duty, are often judged of by observers as "figure heads," men having "a soft snap;" paid a big salary for doing nothing. Little conception such critics have of the hard, tedious, exacting labor such men are often performing. They seem to think their labors should be exhibited by an herculean effort of the arms and legs, interspersed with occasional opening of a volcano trap to belch forth terrifying sounds. The quiet, unostentatious superintendent, or "figure head," as some would call him, well knows that to achieve success in the performance of his duty it is brains and not bluster that must be used, and the main secret is in giving strict attention to details. He may be required to use his legs some, but at the end of the day's labors his brains will require by far the most rest. The detail work a superintendent or assistant may do is not all conceivable to any mind other than his own. It is only the workman's physical efforts that are tangible to conception by all, and each are as distinct in their function of exhibiting labor as it is possible for mental and physical efforts to be.

The daily details demanding attention may consist in deep thinking, designing, in directing, in inspecting and in educating or disciplining men. Altogether there may be hund-

reds of little things requiring study and concentration of the mind to insure desired results. They are a load which will not permit of rest in study or watchfulness. Its weight cannot be shaken off, sitting or standing. The mind must be impregnated with them so firmly that not a single item can escape having attention or be forgotten. The superintendent or assistant must know to the minute when his attention will be necessary to catch and correct errors in the manipulation of work which, from forethought, he conceives likely to occur. He will foresee and prevent accidents. The expected and the unexpected he will ever be on the alert for. Every person under his supervision is as easily controlled as the fingers of his hands. At any moment he knows what any individual should be doing. You cannot ask him a question that would betray ignorance of the doings of any man under his charge, or what is going on in his department. Surely such accomplishments are entitled to be credited as being no "soft snap." To be a good man for watching details is a very valuable quality to possess. It is equal to having power to design, to instruct, to dispatch work and get the best results out of men.

A man having all the above qualities combined is a very valuable superintendent or assistant. Too often are some of these qualities found very weak or entirely lacking. It greatly lessens a man's value if by keen thought and watchfulness he discovers details going wrong but lacks the force of character to properly oversee, reprimand and compel the wrongs to be righted.

The close watching of details in every manufacturing establishment by superintendent and assistants is akin in many respects to the duty of a general manager or president, the difference being that what he would lack in numbers would be more than made up by their importance and weight. Should one be neglected there is a chance of it bringing disaster or ruin to the establishment. With him lies the responsibility of the financial success of the firm. He must plan and study to obtain work, and then do the same to have it pass through the hands of his assistants in a manner to insure perfection in manufacture. He must be in touch with the outer world and know all that is going on, especially in his own line. If other competitors are able to undersell his firm, he must endeavor to make changes in his mode of manufacture that will admit of competition with a profit. All superintendents and assistants look to him for instruction and advice in all important transactions of their respective departments, and in all that is great and masterly concerning the establishment. He is the first to decree what shall be done, and is responsible for its enactment. Be he assistant, superintendent or general manager, he will find it is the little details of his duties that give him the most labor, and to insure success they must be as closely watched and attended to as the large and important ones.

The regular monthly meeting of the Western Foundrymen's Association will be held on Wednesday, December 20, at 7.30 p.m., in rooms 702 and 703 Temple Court Building, corner of Dearborn and Quincy streets, Chicago. Hon. E. A. Wheeler of Sharon, Pa., will read an interesting paper on "Furnace vs.

Foundry Practice." An amendment to the by-laws governing propositions for membership will be acted on. Secretary B. M. Gardner, 1437 Monadnock Block, Chicago, earnestly invites all foundrymen to be present, whether members or not, and to take part in the discussion.

The Industrial Society of Copenhagen, Denmark, will hold a special exhibition in January next, of such new inventions as may be considered likely to be useful in the kingdoms of Denmark, Norway and Sweden, and especially such as may be of service to the handicrafts and industries of those countries. The object of the exhibition, says a European exchange, which will be held in the premises of the Industrial Society, is said to be partly to give native and foreign inventors and holders of patents an opportunity to make their inventions known in the three countries above mentioned, and partly to give mechanics, artisans, owners and managers of industrial establishments and others a convenient opportunity to convince themselves of the nature of the inventions exhibited, as well as the latest advances in their special branches. Applications for space, for which no charge will be made, may be made to the Industrial Society, Copenhagen, V., or to the Copenhagen Patent Office (Kjøbenhavn's Patent Bureau), 48 Vimmelskaftet, Copenhagen.

Dr. Coleman Sellers of the Niagara, N. Y., Power Company; Secretary W. B. Rankine of the Construction Company, and William Sellers, Jr., recently witnessed cable manufacture at Philadelphia, which may result in a new industry for Niagara Falls. The cable making is known as Tatham's patent process of manufacturing electric cables and incasing them in a lead covering. It is designed for the transmission of electrical energy and for placing in conduits and subways. James Tatham, the owner of the cable making patents, is a member of the firm of Tatham & Bros. of Philadelphia, the oldest lead pipe and shot makers in the United States. Mr. Tatham has expressed his intention, in case this style of cable is adopted by the Cataract Construction Company, to erect a big plant at Niagara Falls for its manufacture, to supply that city and the Western market. P. C. De Sangué, representing them, has been in Niagara Falls looking for a suitable site. It is very probable that the plant will soon be established.

On Tuesday, the 5th inst., the semi-annual meeting of the Tinned Plate Manufacturers' Association of the United States was held in its headquarters in the Times Building, Pittsburgh. The proposed reduction in the tariff on tin plate from 2½ cents per pound to 40 per cent. ad valorem was thoroughly discussed by the manufacturers present, and it was the sense of the meeting that if such reduction was put in force it would materially injure the tinned plate manufacturers all over the country. It is probable that in the near future a committee of prominent tin plate manufacturers, in conjunction with Secretary John Jarrett, will go to Washington for the purpose of endeavoring to have the present duty on tin plate retained.

An iron valve weighing 6500 pounds has been made at Troy, N. Y., for a Havana sugar mill, which is claimed to be the largest valve ever constructed.

New Boiler Makers' Tools.

The Manistee Iron Works Company of Manistee, Mich., have placed two new tools on the market for the use of boiler makers, which are herewith illustrated. The power flanging clamps, Fig. 1, are stated to be a new departure in boiler makers' tools. The machine is a great saver of time and expense in flanging sheets. It is also useful for taking the twist out of sheets and

are recessed $4\frac{1}{2}$ inches to allow for re-turning a flange. The weight without dies is 11,000 pounds.

The other machine shown, Fig. 2, is a beveling shears for chipping boiler plate. The upper blade is on the extreme end of the lever, so that there is nothing to obstruct a perfect view of the work, and it also enables the operator to chip as close as a $2\frac{1}{4}$ inch flange on connections as small as 10 inches diameter by 24 inches circle. An extra convex lower shear blade is furnished

representative, E. G. Edwards, to replace all their tinning processes by that of the Edwards method. The above firm, one of the most progressive on the European Continent, arrived at this decision after careful study and protracted practical tests of different systems.

The Fair Buildings Will Stand.

The World's Fair buildings at Chicago will not be torn down and re-

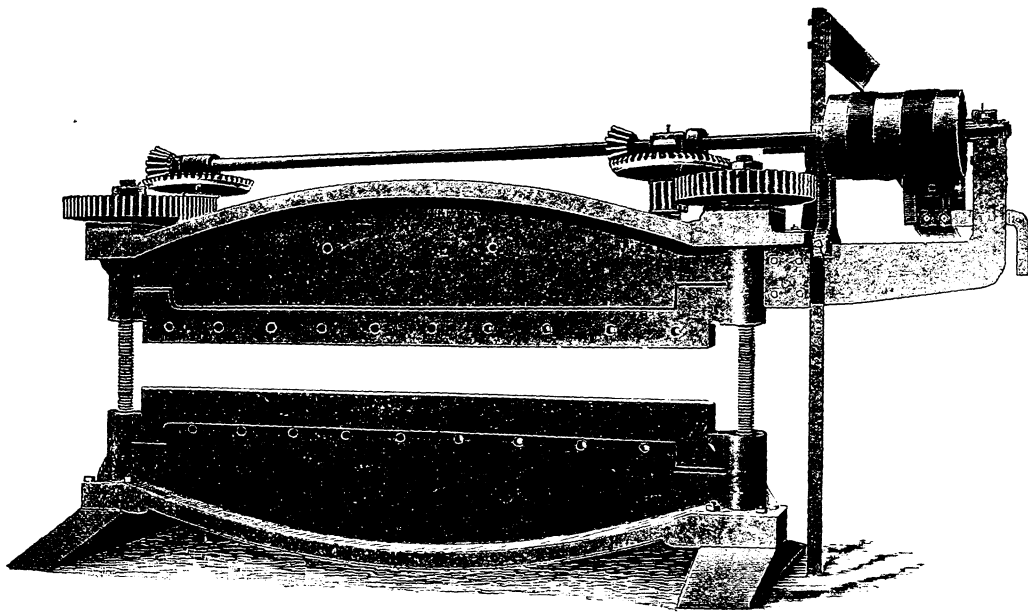


Fig. 1.—Power Flanging Clamps.

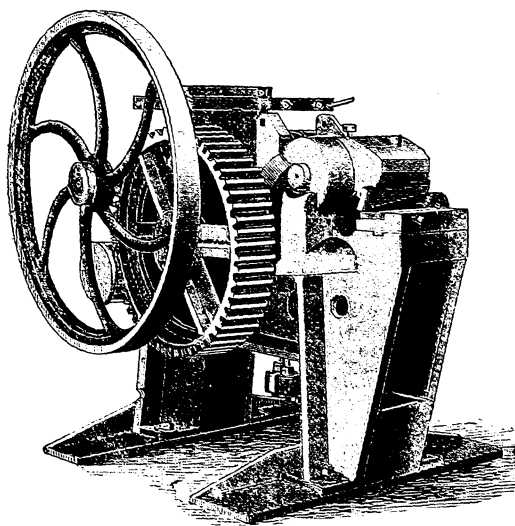


Fig. 2.—Beveling Shears.

NEW BOILER MAKERS' TOOLS.

straightening them after flanging. Both ends of the machine raise and lower alike, so that the jaws are parallel, no matter where the work is placed. The beams are 10 feet long in the clear and 30 inches deep. The upper one can be raised or lowered 18 inches at a speed of 2 feet per minute, driven by two 4-inch belts, one crossed and the other straight. These beams are so constructed that a pair of dies for flanging the inside or outside corners of fire box rings or other irregular shapes can be bolted on at right angles and projecting far enough to enable the strikers to turn the flange comfortably. The ends of the beams

for this purpose. The machine is powerful and very compact, occupying a space of only $4 \times 6\frac{1}{2}$ feet. It is 3 feet 3 inches high from floor to lower blade. Two sizes are made. No. 1, weight 4500 pounds, is suitable for $\frac{3}{4}$ inch plate; No. 2, weight 5800 pounds, for 1-inch plate. Thanks are due the *Boiler Maker* for the use of cuts.

The Westphaelische Union Company (Hamm, Germany), who employ several thousand hands, have recently made arrangements with Daniel Edwards, Swansea, Wales, through the latter's rep-

moved as summarily as has been expected. The exposition authorities have made an agreement with the Park Commissioners, controlling Jackson Park, in which the fair was located, by which the latter release the former from all obligation to restore the park to its original condition. The exposition directory will pay the Park Commissioners \$200,000 for the release and relinquish possession of the park on January 1. State buildings are, of course, not included in the transfer of property to the Park Commissioners, but all the great and small structures erected by the Exposition Company are transferred, including the Administration Building, Machinery Hall, Mines and Mining Building, the Terminal Depot, the Electricity, Liberal Arts, and Agriculture buildings; the peristyle and its annexes of the Casino and Music Hall, forming the great court of honor, which in architectural effect has never been equaled; the Transportation, Horticulture, Fisheries and Anthropological buildings; the Art Gallery, the Convent of La Rabida, the Shoe and Leather Building, Stock Pavilion, barns, band stands and pagodas. If any salvage is realized from the sale of material in these buildings in the course of time it will now inure to the benefit of the Park Commissioners. They can take plenty of time for this work and can await a more propitious period in which to offer the several structures for sale. When the fair buildings were in process of erection the exposition management intimated that a good round sum would be realized from salvage, but that hope was abandoned long since, and it was deemed inevitable that heavy loss would be incurred if the buildings were torn down during the coming year and

the park restored to its old condition. In the contract just made there is a stipulation that the city of Chicago may be permitted to remove the Manufactures and Liberal Arts Building, if arrangements are made for its re-erection elsewhere.

Recent Progress in the Manufacture of Steel Castings.*

BY H. L. GANTT, ELIZABETH, N. J.

When I spoke of the condition of the art a few years ago, probably but few realized how very few years were really meant. The first soft steel castings, such as are used for gun carriages, that were made in this country, and which were subjected to a ballistic test, were made in 1886 and 1887, by the Midvale Steel Company, who were the pioneers in this work. The ballistic test was considered severe at that time; but to-day the ordinary soft castings made by almost any one of a dozen of the best steel casting companies would pass it successfully.

Though it was about 1886 or 1887 before any large increase took place in the use of steel castings, they had been successfully made in this country at least as early as 1867.† In July of that year, the Wm. Butcher Steel Works, now the Midvale Steel Works, cast some crossing frogs for the Philadelphia & Reading Railroad, of crucible steel. The molds were made of ground fire brick, black lead crucible pots ground fine, and fire clay, and washed with a black lead wash. The surface of these castings was very smooth, and the metal, which was practically tool steel, was so well adapted for the purpose that some of the castings made in those early days are said to be still in use.

This was before the use of silicon for solidifying steel was known, and the castings were very much honeycombed in all parts except the wearing surface of the frogs, which was "cast down." The possibility of getting one face of a casting approximately solid admitted of the use of steel also for hammer dies, although their general sponginess was a great obstacle to their extensive adoption.

On April 28, 1876, two small hammer dies were made of open hearth steel at the same place, and on May 29 a hammer head weighing 2535 pounds was made. As long as castings were small, the molding mixture of ground brick, ground pots and fire clay was satisfactory, but on large castings made with that facing the surface was very imperfect, and the sand adhered to it with great tenacity. But little improvement in the method of molding was made for some time, and while the quality of the steel was gradually improved, the appearance of the castings was decidedly against them, and but little progress was made in their introduction.

The next step taken by the Midvale Steel Company was to leave the ground pots out of the molding mixture, and to wash the mold with finely ground clay fire brick. This was a great step in ad-

vance, especially in heavy castings, and a marked improvement took place in their general appearance, but the mixture still clung so strongly to the casting that only comparatively simple shapes could be made with certainty. A mold made of such a mixture became almost as hard as fire brick when dried, and offered so much resistance to the proper shrinking of castings that, when at all complicated in shape, they had so great a tendency to crack that their successful manufacture was almost impossible. The next step was to use a mixture of silica sand and flour. In small castings this gave pretty good results, as such a facing cleaned off the casting very readily, leaving a smooth surface much superior in appearance to that left by the ground brick. The great difficulty in the way of the extended use of such a facing was the tendency of the flour to burn in drying, leaving the sand without a proper bond, and often the burnt mold was so friable as to be entirely useless. In the case of large castings it was almost impossible to dry thoroughly the whole mold without burning that portion nearest the fire, and for such work flour was necessarily abandoned.

By this time the use of silicon for solidifying castings was becoming general, and the only obstacle in the way of making good steel castings was the want of a suitable molding sand. This was ultimately found in a mixture the principal constituents of which were silica sand and molasses thoroughly ground together.

The improvement in the appearance of castings caused by the use of a sand that left a clean, smooth skin was the cause of their rapid adoption; and the year 1887, when the Midvale Steel Company made the first gun carriage castings of steel, is approximately the date at which their rapid extension began.

At this time the necessity for hot metal did not seem to be understood, and castings frequently contained blow holes, when it seemed that all the conditions for making them perfect had been complied with. It was noted before a great while that small castings contained more holes than large ones, and that those poured last on a heat were worse than those poured first. The conclusions that hot metal was needed to make solid castings, and that smaller castings needed hotter metal than large ones, were soon deduced and amply verified. Apart from these considerations, the superior appearance of castings made from hot metal was sufficient to cause all steel casting makers to work in that direction. The difficulties in the way of getting uniformly hot metal are hard to overcome in an open hearth furnace. The delay caused by a slow or difficult tap of the furnace, which is always liable to occur, is fatal to the production of the best castings. Besides what has already been mentioned, cold metal in the ladle is to-day the cause of more complaints by purchasers and expense to the manufacturer than anything else in connection with the manufacture of steel castings. I will enumerate a few of the troubles that may be traced directly to this cause. What is known as a "bad shut off," or a leaky stopper, is usually caused by a small amount of metal chilling in the nozzle and preventing the stopper from going to its place. In cases where the dribble is slight the worst effect is that a small amount of metal runs into the mold while the ladle is being gotten over the runner. This metal is apt to chill, and make a bad looking spot on the casting, or, in the case of small castings, block up the runner entirely, and

cause the loss of the mold. When the leak is very bad it not infrequently happens, especially when the heat is a large one, composed principally of small castings, that the flasks are covered by the molten steel and so strongly fastened together that it is almost impossible to separate them from the steel without considerable loss by breakage. Again, by a careful study of the subject, I feel that I have been able to lay to the door of cold metal one of the most fertile sources of complaint which steel founders have met with—namely, lack of homogeneity, which includes both hard spots and loose places. I use the term "loose" rather than spongy, for the reason that I do not so much mean a cluster of holes as a spot where the metal simply seems less dense. Such places, without any visible continuous hole, or even without anything that would indicate the existence of such a hole, allow leaks in hydraulic cylinders, and cause the failure of a test bar.

When we consider more in detail the process of making open hearth steel castings, we see why these defects are more apt to occur in cold than hot metal. While the metal is being tapped from the furnace, the silico-spiegel necessary to prevent blow holes is generally thrown into the ladle, usually in the solid, though heated, state. If the metal is very hot, and consequently thoroughly fluid, the silico-spiegel is dissolved at once and uniformly disseminated through the mass. If, however, the metal should not be so hot, it is easily seen that the silico-spiegel may not become at all thoroughly diffused, and the slightly viscous metal in the ladle may be the reverse of homogeneous, in which case the resulting castings may be very far from what is hoped for. It is now the practice in the best foundries to melt the silico-spiegel, and these defects in their worse form are thus practically eliminated.

Why hard spots should appear in cold metal is readily seen, for lumps of partially melted silico-spiegel would certainly form the nuclei for such spots; but why the loose places should occur is not quite so apparent. It may be noted that the loose places appear to a more marked extent in large masses than in small ones, and the most reasonable explanation seems to be that the silico-spiegel, which is but imperfectly melted when the metal is poured, finally melts thoroughly after the metal is in the mold, which can only occur in very heavy castings, forming a spot higher in carbon, manganese and silicon than the metal surrounding it. Such a spot would have a lower melting temperature than the adjacent metal and would remain partially fluid after the other metal was set. The result of such a condition would be to drain away a portion of the fluid metal to feed the shrinkage in the metal solidifying about it, leaving a more or less spongy spot.

That shrinkage holes and cracks do still occur in steel castings is well known, but the success that founders have had in casting complicated shapes within the past year or two has been surprising. The fact that a steel casting must cool at the bottom first, and then gradually upward in the mold, is being learned by designers; and shrinkage holes are becoming less frequent, for the founder at once fixes on the heaviest portion for his sink head, which is usually about 20 per cent. of the total weight of the casting, and which must remain fluid until the whole of the casting proper is solid.

By a strict observance of the rule that

*Presented at the New York meeting (December, 1893) of the American Society of Mechanical Engineers.

† This historical note was furnished some time ago to Edwin H. Cramp to go into a paper he purposed to write on the subject of steel castings, but it has seemed to me to be of sufficient interest to publish it here also. If any member has any additional information on the subject, I should be glad if he would add it in the discussion.

a steel casting should, as far as possible, be of uniform thickness throughout, it has been possible to make within the past few years castings 20 feet long by 10 feet wide, which would have been considered impossible a few years ago. To one unfamiliar with the details of the process of making steel castings, the statement that to-day we can get large steel castings that are perfectly satisfactory, while it is almost impossible to get good small ones, would seem very strange. It is, however, a fact, and the explanation is simple. Most steel castings are made by the open hearth process, and the furnace usually melts from 5 to 20 tons. To pour even 5 tons of steel into castings averaging 100 pounds in weight would, as a rule, take so long that those poured last would be of inferior quality on account of the cooling of the metal. As a rule, a large portion of the heat is poured into a comparatively few large castings, and the remainder put into the smaller ones. If the metal is very hot to start with this may give fair results, but in all cases the least desirable metal is put into the small castings.

This difficulty seems almost insurmountable by the open hearth process, but is readily overcome by a small Bessemer converter, from which we can get 2 or 3 tons of metal as hot as we may wish it. Add to this the fact that we can get from the converter that quantity of metal of any composition we may desire every half hour throughout the day, and we realize the advantage of the Bessemer process for making small and medium weight castings. The manufacturers of electric motors who have been buying their castings from open hearth foundries have apparently not realized what the Bessemer foundry has in store for them. It seems hard to believe that perfectly solid steel castings can be made of the following composition with regularity: Carbon, 0.12 per cent.; manganese, 0.30 per cent.; silicon, 0.30 per cent., but it is a fact. It may be noted, however, that this steel, while very well adapted to electrical purposes, is of but little value for any miscellaneous castings, except very small ones, on account of the tendency it shows to crack during the process of solidifying, when cast in shapes at all complicated.

The fact that we can make a number of different kinds of steel each day if we use a converter, and but two or three heats at the most in 24 hours if we use an open hearth furnace, gives a great advantage to the founder using the converter, especially if he is making all kinds of steel castings, enabling him, as a rule, to make far more prompt deliveries than is possible for the open hearth founder doing the same variety of work.

Among the other advances made in casting steel may be mentioned one for making a casting having one or more faces of a steel much harder than the body of the casting. The process consists in lining such faces of the mold as will be adjacent to the parts of the casting it is desired to harden with a metallic alloy in a crushed or powdered state, capable of being melted and absorbed by the molten steel in contact with it, and of such a nature as to impart to the steel a hard face, or a face of such a composition as may be readily hardened. If it is desired that the casting shall have a permanently hard face and be used for stamp shoes, crusher jaws, hammer dies, &c, ferro-manganese gives the best results. If it is desired to do machine work on the face, and make it extremely hard after-

ward, ferro chrome is most suitable. The fact that it is possible to produce a soft steel casting having a face that can be hardened without causing the remainder of the casting to become brittle will undoubtedly make it possible to use steel castings in place of chilled iron in many places with great advantage.

Discussion.

H. A. Royce, general manager of the Thomson Electric Welding Company, described some experiments which they had made to remedy the evil effects produced by blow holes. The object aimed at was, when a blow hole was discovered, to fill it with steel in such a way as to make a perfect union between the plug filling the blow hole and the mass of steel itself. They had been able to do this successfully both from a commercial and practical point of view, and their process had proved to be not only perfectly efficient but economical as regards cost and time and resulted in the saving of many castings which would otherwise have been considered useless. He stated that this method was more or less in use in Russia and had been introduced quite extensively and on a commercial scale in England.

Their first experiments consisted in the employment of the electric arc, the mass of steel forming one pole and a carbon, held at the blow hole to be filled, forming the other pole. The formation of the arc by the current passing between these two poles furnished heat sufficient to melt small steel scrap or filings introduced into the hole. But this method was not successful, because of the chilling action of the walls of the hole on the plug of steel introduced into the hole, and the union between the two was therefore not perfect. Success of the most perfect description was obtained by heating the mass of steel in an oil or gas furnace and then utilizing the electric arc for the melting of the steel filings introduced into the hole. In this way they had succeeded in a few minutes in making so perfect a union between the plug introduced into the hole and the walls of the casting that no line of demarcation was apparent when the piece was planed down.

In answer to a question as to whether the Krupp steel locomotive frame exhibited by the Krupp concern at Chicago could be reproduced in this country in a commercial way in competition with the ordinary forged frame, Mr. Gantt answered that while the first frame produced would probably not pay, an order for a hundred would be remunerative. He saw no reason why three or four firms at least could not make a frame of this character of a quality equal to that exhibited by the Krupps.

Thomas Fitzgerald, one of the superintendents of the Baltimore & Ohio Railroad, and Eben T. White, master mechanic of the same road, are said to have recently patented a device for the construction of locomotive furnaces by means of which air may be supplied in such quantities and at such temperature as to effect thorough combustion of smoke and gases generated in the use of bituminous coal and similar fuel. If so desired, the air may be supplied in three volumes. One of these enters the fire box through the grate bars, generates the gases from the coal and partially consumes them. The other, being previously heated, enters through an air duct into the burning fuel and partially consumes the generated gases, while the remaining volume of air, hav-

ing also been first heated, enters the fire box at a point remote from the boiler flues and completes combustion with intense heat.

The Brown Automatic Fire Alarm System.

While the importance of a reliable automatic fire alarm system has been recognized for years, the subject has lately received more than usual attention from all interested, from the fact that the losses from fires have greatly increased, and in many sections the insurance rates have also increased. It is conceded by many of the best authorities that a reliable system of this class gives better and cheaper protection against fire than a watchman.

The following have been laid down as axioms to be considered in an automatic fire alarm system:

1. Any system, to be entirely successful, must be of such a nature that any accident to the battery or wiring that will render the system inoperative will at once notify the attendant at the receiving station without sounding a fire alarm. In short, a system must watch itself, and notify whenever it needs attention.

2. It must be prompt and sure to act and entirely unaffected by dust, insects, moisture, foul gases or jarring of the building, &c., and require no readjustments.

In the interests of economy, such a system should require but very little current for its operation and be easily and cheaply installed. Any system which does not embody all these features cannot be entirely satisfactory in practice.

The first axiom not only makes it necessary that the system shall be closed circuit, but that the entire current required to give the alarm shall flow all the time; otherwise the extra batteries and lines intended to be brought into action by the thermostat may not be operative. All closed circuit systems which depend upon breaking the circuit to sound the alarm are subject to the fatal fault of sounding false alarms whenever the line is broken or short circuited by accident. To obviate this, it is necessary that the thermostat in acting shall make some change in the line which is never made by accident, and that the receiving instruments be so arranged as to indicate what change has taken place.

In the system in question, by very simple mechanism, the thermostat in acting reverses the current, instead of simply stopping it. Reversing the current is a change which never occurs by accident; hence the receiving instrument will never indicate fire unless a thermostat has acted. The receiving mechanism consists of a simple electro-mechanical gong, controlled by a polarized armature of the rotary type, to which is attached a pointer moving over a suitable dial arranged to show just what change has occurred in the line. This dial, Fig. 1, is marked "O. K." on its right hand end, below which are the words "Battery Run Down," in the middle "Line Broken," and on the left hand end "Fire."

The magnet and armature are of new design, giving a long movement of the latter, with a very small current. This enables the system to be maintained at a small expense, the common gravity battery being used. The polarity of the armature of this magnet can never be reversed by any of the accidents to which the system is subject, nor will it stick to the poles of the magnet or require readjusting. This armature is

brought to center by small weights, which, in practice, are more reliable than springs. An important feature of this apparatus is the fact that the battery current can rise much above or fall much below the normal without affecting the working of the system. This system can be arranged with two bells, one of about 8 inches in the engine house to ring for fire only, the other of small size to call attention to trouble with the line. A large striker is also provided to strike a factory or other large bell one blow to indicate trouble with the line and continuous ringing to indicate fire. This is important in places where firemen are not on duty at all times.

One of the most important features of an automatic fire alarm is the thermo-

stat, upon which to a large degree the efficiency of the system depends. The one illustrated in Fig. 2 is constructed and operates as follows:

Upon the lower side of a porcelain base are clamped two flat bronze springs, which are held under tension by a fusible solder, the melting point of which can be changed to suit different positions. To the upper side of this base is clamped a plate of vulcanized fiber, through which screws pass into the ceiling to fasten the thermostat in position. In the center of the porcelain base and covered by the fiber plate is molded a cavity which contains electroplated contact points brought into action by releasing the springs. These contact points are punched from sheet brass and riveted to the bronze springs, extending through the porce-

lain into the cavity referred to, and so arranged as to press against suitable electroplated copper strips connected in such a way as to reverse the current when the springs are released by melting the solder. The working parts of this thermostat are entirely protected from dust and insects. The part sensitive to heat is entirely uncovered and in the best possible position to be affected by direct rays as well as the heated air from a fire, and being thin acts promptly and will never change its adjustment. The contacts being made on clean metal and with considerable pressure are sure to be good, and the electric contacts with the line wire are such as will not become loose or cut the wire. It is unaffected by jarring of the building or the warping of the wood to which it is fastened, nor is it affected by being wiped or brushed.

The action of the system is as follows; In case the battery should be allowed to run down the armature is drawn toward its central position by the weight until the hand points to "battery run down," when the striking mechanism is unlocked and the bell strikes. The attendant, on looking at the dial, sees that the bell is striking because the battery is run down, and to silence the bell turns over the small handle on the left-hand side of the case, which, besides stopping the striker, turns up a card over the dial marked "disconnected," which shows that the system is inoperative. Even under these conditions the system will sound an alarm in case a fire should occur, unless allowed to stand too long. In case of a broken line or short circuit (which in this case is equivalent to a broken line), the same thing takes place, excepting that the pointer indicates "line broken." In this case when the line is repaired the bell again strikes to notify the attendant that the line has been repaired, and the hand points again to "O. K.," the bell being silenced by turning the lever and card back to the original position. In case of fire the bell rings and the pointer is

The Foundrymen's Association.

The regular monthly meeting of the Foundrymen's Association was held at the Manufacturers' Club, in Philadelphia, on Wednesday, the 6th inst., with a large attendance of members. In the absence of the president the chair was occupied by the vice-president, Thomas Devlin of Thomas Devlin & Co., Philadelphia. The minutes of the last meeting were read and approved. The Executive Committee reported that a meeting of that body had been held on the 5th inst. at which the affairs of the association, past and present, were discussed. It was their intention to pursue the same methods as hitherto used to collect information of interest, and to bring about a friendly feeling in the foundry trades. The pleasing address made by the president at the last meeting covered the ground, the committee thought, very nicely. The thoughts therein expressed for the future welfare of the association would be carried out as nearly as possible. A number of subjects had been presented to the association for discussion from time to time during the past, the one unfinished being "Chemical Analyses." The secretary was getting information from different chemists in regard to charges, in order to get the cost of determinations on a sliding scale according to the number of determinations made. The number of determinations likely to be required would then be ascertained, and in this way it was hoped an arrangement could be effected which would allow of members getting determinations at a minimum of cost.

The subject "Molding Machines, and How Far They Can Be Used Successfully," would be taken up at the De-

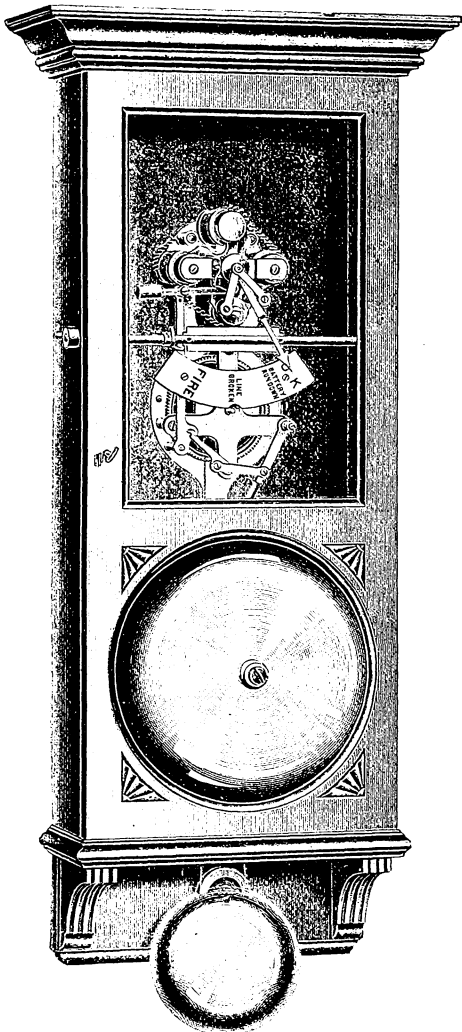


Fig. 1.—Apparatus Complete.

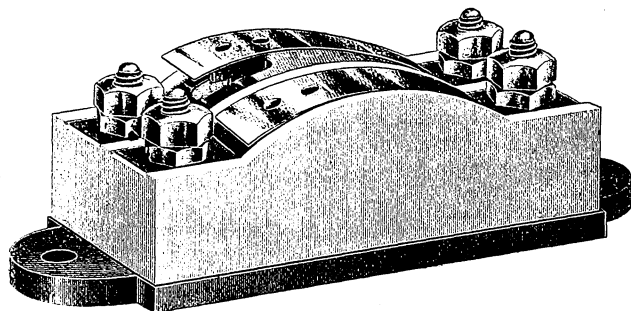


Fig. 2.—Thermostat.

THE BROWN AUTOMATIC FIRE ALARM SYSTEM.

stat, upon which to a large degree the efficiency of the system depends. The one illustrated in Fig. 2 is constructed and operates as follows:

Upon the lower side of a porcelain base are clamped two flat bronze springs, which are held under tension by a fusible solder, the melting point of which can be changed to suit different positions. To the upper side of this base is clamped a plate of vulcanized fiber, through which screws pass into the ceiling to fasten the thermostat in position. In the center of the porcelain base and covered by the fiber plate is molded a cavity which contains electroplated contact points brought into action by releasing the springs. These contact points are punched from sheet brass and riveted to the bronze springs, extending through the porce-

carried to the word "fire," and locked in that position, where it remains until released by the attendant.

It will be seen that this system is free from relays and local circuits, which in practice have been found to be unreliable. In the arrangement of the annunciator and public alarm bell, with which this system is provided, no element is introduced that can interfere with the action of the engine house gong, bearing in mind that the action of this bell is by far the most important function of the system. With this in view, care has been taken that its action should not depend upon anything delicate or uncertain or be in any way interfered with by the failure of the other instruments. This system was designed by Gilman W. Brown of West Newbury, Mass.

member meeting of the association, and manufacturers of these machines would be invited to attend the meeting to present their respective claims and answer questions. The committee hoped that the present depression in the foundry trade had reached its limits and that the demand for castings would improve. The passage of the repeal bill by the Senate, although coming late, would help to restore confidence in the financial world, and the voice of the American people in favor of protection, as decided by the late election, was very significant. It would probably do more than any one thing to prove that protection was wanted in this country. The committee believed that when the next Congress met it would look at the large majorities in New York, Ohio, Massachusetts, Iowa, Pennsylvania and

New Jersey as a remainder that the tariff issues as set forth in the present Mc Kinley bill were satisfactory and would come to the decision that it would be best to "let well enough alone." The report was, on motion, received and ordered to be entered upon the minutes.

Secretary Evans announced that he had secured information as to prices on a sliding scale at which analytical determinations could be obtained, and read a number of offers from chemists in New York and Philadelphia.

Mr. McKenna of the laboratory of Dr. Gideon Moore, New York, was present and in the course of a few remarks said that he would encourage the members in the idea of some day using research, and they could be assured that it would prove a benefit to them. The results of daily tests could be compared and used to the benefit of the association just as well as if the work done was research work. The results of research work were, he said, far reaching. There were technical concerns in Germany keeping a force of 20 chemists on purely research work, and in the case of competitors taking their trade away those chemists would rapidly place them in the possession of facts which would bring back the lost trade. In days to come the association would not regret the employment of chemical talent.

W. C. Henderson, chemist for Thos. Devlin & Co., in regard to an arrival at the number of determinations likely to be required by the association, said that it would be utterly impossible for any member to state exactly how many determinations he would require. The number would depend on the kind of trouble he got into. If his castings were going wrong he would probably require an analysis of them.

Mr. Whitney of A. Whitney & Sons, Philadelphia, manufacturers of car wheels, said that his firm obtained about 2000 determinations last year.

Mr. Henderson said the determinations made for his firm would amount to from 1500 to 2000 in one year, and then he considered they were not having as many as they should have. After discussion the matter was, on motion, referred to the Executive Committee.

The Condition of Trade.

The report of the Price Committee being next in order, Stanley G. Flagg, Jr., of Stanley G. Flagg & Co., Philadelphia, for the small gray and malleable iron castings section, reported that business continued in the same condition as when last reported. He had nothing of interest to present to the meeting. L. B. Whitney of A. Whitney & Sons, Philadelphia, for the car wheel section, and Geo. P. Smyser of E. G. Smyser's Sons, York, Pa., for the structural iron work section, had nothing to report.

P. D. Wanner of the Mellert Foundry & Machine Company, Reading, Pa., representing the cast iron pipe section of the committee, reported that business was getting worse. Prices on cast iron pipe were simply out of sight and were really panic prices. If anybody had told him five years ago, or even six months ago that such prices would prevail he would not have believed it. He did not think for one moment that pipe could be made at the prices it was being offered at. He said there had been a letting at Washington and another in Philadelphia. Something like 26,000 tons were given out in Philadelphia, and contracts were taken at a very low price, 1 cent per pound, delivered on the street, being the figure for some of

the pipes. Since that letting contracts for 70,000 feet of pipe had been given out at Washington, 40,000 feet of 12-inch and 30,000 feet of 6-inch. Most of the pipe manufacturers from all over the country were on hand and those who bid made very low bids; one bid was \$20.70 per gross ton, delivered at Washington. This price he thought was a record breaker. How could anyone suppose cast iron pipe could be made at that price unless the pig iron men furnished the iron for nothing? He presumed those that had pipe on hand were anxious to get rid of it and were giving it away. Two thousand tons of the Philadelphia pipe, he said, was taken by the Alabama people. Facts like these, he thought, were hard to account for. A great State like Pennsylvania, with all its coal and its iron, being passed on iron pipe! There was something entirely abnormal about it. The trade will get back again one of these days; it cannot help doing so; but some will have to suffer in the meantime. Those present could figure for themselves as to what the pipe was being put in at and as to what the loss was. He noticed in the Executive Committee's report a reference to the tariff question. He did not want to branch out on that question, but thought it was a matter of greater importance to them at this time, as foundrymen and citizens, than any other question, and it occurred to him that if the members of the association wished to assert themselves as citizens and patriots during the next three months they should take up the question and discuss it. He was a protectionist, and, as such, was no politician. He was of the opinion that the tariff question should always be left out of politics. Any question that strikes at the interest and welfare of all citizens cannot well be a political question, although such it is made. He thought the association should take up the question for discussion and urge the speedy determination of the matter. The Wilson bill, or new tariff bill, now before Congress, must, he said, be passed or dealt with without delay, or be abandoned. He had stated at previous meetings of the association that manufacturers were reduced to a point at which they could stand no further reduction, and that the next cutting to be done would be on labor. The point had been reached where such a step would be forced on them. If, as manufacturers and employers, they did what they should do, they would drive the issue to a point and drive it speedily. For this reason he thought they all should come together to talk the matter over in order to arrive at a conclusion in regard to an endeavor to force the issue.

Asked by Mr. Flagg where the balance of the pipe order, part of which went South, was placed, Mr. Wanner replied, "It went to New Jersey. New Jersey has not a great deal of iron, but has a considerable amount of sand."

R. A. Register of Register & Sons, Baltimore, Md., for the cast iron soil pipe section of the committee, reported progress. He thought the reason why pipe comes through the State of Pennsylvania might be that the freight on manufactures of iron from the South was less than on pig iron. That he knew to be a fact. Pipe from Alabama could be freighted at 40 cents a ton less than pig iron.

Secretary Evans then, under the head of new business, announced that the association would take up the subject of "Molding Machines." He said he

had a number of letters from people who were making molding machines, and Harris Tabor, representing the Tabor Molding Machine Company of Elizabeth, N. J., had been asked to read a paper on the subject before the meeting.

Mr. Tabor then read the following paper:

Molding Machines.

Although molding machines are not new in their application, they are comparatively little understood except in a few branches where there is great duplication of castings. It is probable that no mechanical subject of such vital importance to the metal trades has been discussed as little. This is due largely to the fact that the mechanical departments in foundries, as a rule, are more thoroughly under the dominion of one man than any other branch of the iron industry; and this man is usually one who has been trained in his method of molding and does not care to try others. There is a certain mystery about the art which he thoroughly understands, and in this knowledge lies much of his capital. His shop education has been that of apprentice and journeyman, generally varied by experience in different foundries, until he is selected as foreman. His work has always been that of judgment rather than measurement. He knows where molds should be rammed hard to prevent "strains" and where soft to avoid "blows," and his touch will indicate when these densities are right; but he has no instrument or tool which determines these conditions for him. It is a question of judgment purely, a judgment which must indicate the location and force of his rammer's blows. In a good molder this judgment is almost infallible; in a bad molder—well, we all know what it means by a reference to the scrap heap.

This peculiar judgment or skill, which all molders possess to a certain degree, and some to an extent which seems like inspiration, tends to make the average foreman skeptical, one might say superstitious, when it comes to considering other methods. His training has been away from machinery rather than with it, and when the proposed innovation takes the form of a machine his objection is intensified. In such a case if the manager takes his cue from the foundry, the chances are that machine molding will not be thoroughly discussed, and nothing short of seeing machines in operation will remove doubt.

Since metal has been wrought the foundry and machine shop have existed side by side, generally under one management. Of the two the foundry is the older; in fact, metal was cast in molds before machines were built. The foundry has always been the feeder to the machine shop, and as long as cast iron enters into construction it will continue to hold the spoon. It should come first, with the machine shop a second; but does it? In the early days of these kindred industries the molder rammed his molds much the same as he does now; he drew his pattern with the same old spike, and he used similar slicks and trowels to mend broken molds; the swab pot and brush possibly then helped to make his kit. It is true his patterns are now better fitted and in many foundries carefully matched and gated, but beyond these improvements, if we except cranes and cupolas, there has been but little change. The machine shop, in its primitive days, was equipped with hammer, chisel and file, and these tools

are still the reliance of an occasional old time vise hand, but they are used on jobs which cannot be machined. The drill press, lathe and planer revolutionized the machine shop years ago; in more modern times the milling machine, turret lathe and jig system have made a still greater transformation, and the end is not yet. Nearly all machine shops of fair size have their tool rooms in charge of men who have a genius for reducing labor cost, whose sole duties are to design and make labor saving tools and appliances. No reduction in cost is considered too small after the fact is established that a saving may be made. If a job go into the machine shop on which a drilling jig will save three or four hours, that jig will be made. But if an order for twenty-five castings go to the average foundry and the use of a follow board would save ten hours' labor, the chances are that the follow board will not be made, and the molder may spend what might have been profit on the job in building up a difficult joint.

In each of these departments there has been a marked progress made in the production per man: greatest in the machine shop. But how has it been made? In the machine shop there has always been an eagerness to accept anything which would displace hand labor and skill and lessen cost. Special machines and tools have taken the place of old methods, thereby making the product better and cheaper, and at the same time making the lot of the workman easier. Improvements have been encouraged and nursed from the management down.

How has the increased production come to the average foundry? Not so much by the introduction of machinery or improved methods, but rather by a system of piece work which makes the individual workman a sort of proprietor and induces him to do his best. In many foundries this has been followed up by teaching a laborer to mold a single pattern, thus further reducing cost. The labor in molding has not been much reduced, but the amount of work done per man has been increased.

The proprietor of a malleable iron foundry making steam fittings in the West once said to the writer that he could not see his way clear to getting another mold per man for a day's work, nor could he reduce the cost per mold, yet his competition was so close that profits were much too low. Under such conditions the manager of a machine shop would consider any plan which promised to reduce labor cost 10 per cent., and he would even take some chance if there were any doubt in his mind.

During the present year we furnished several duplex molding machines to a foundry which is run in connection with a machine shop. The foreman of this foundry said, in a conversation on the subject of machine molding, that his superintendent had just spent about \$3000 for a special machine which would save a part of the cost of tapping, and he supplemented this statement by adding that he had said to the superintendent if he could have another molding machine at a cost of about \$1000 he would save more in the foundry than the entire cost of tapping, of which the special machine would save only a fraction. He finished with: "But this is the foundry and must wait."

If we go into design we find there the same discrimination against the foundry and in favor of the machine shop. I doubt if there be a founder present

who does not occasionally get patterns which were made with a view to saving labor in the machine shop without a thought of the foundry. This is often carried to the extent of making patterns from which it is almost impossible to get good castings, when a little thought given to the foundry end would save much trouble and cost. While the conditions thus far considered may be said to have no direct bearing on the subject of molding machines, they have had, and do now exert, an influence which tends to create a prejudice against the adoption of such machines in some quarters.

As your association is interested in what may be termed the commercial merits of this subject, the question will be discussed from that standpoint as nearly as possible. There are certain conditions which are necessary to the production of economical work from molding machines.

1. There should be a reasonable number of castings made from one pattern, or set of patterns, and this number will depend on the class of castings and cost of molding same by hand. If the patterns to be molded are 1-inch elbows, of which a smart bench molder will put from 600 to 1000 per day, depending on the foundry he is working in, and at a cost of from $\frac{3}{16}$ to $\frac{1}{4}$ cent per elbow, this number must be much greater than if larger elbows, which cost 10 cents each for molding, are considered, and the saving over hand work will be less in the case of the smaller elbows. This duplication should be estimated from the cost of molding, not from the number of castings to be made.

2. The kind of castings to be made must be reckoned with work which requires a three-part flask, and patterns with too many drawback or pick out pieces are better left to the hand rammer. The first case is impracticable on a molding machine, and the saving in the second case might not justify the cost, unless the castings are expensive to mold. Economy in machine molding is reduced when core setting comprises a large part of the time needed to make the mold, although in such a case the core setting may be done by help independent of the machine.

3. Molding machines should not be introduced unless they can be given the same care that is given machinery elsewhere. They do not require much, but this little is indispensable if one would get good work from them; they should be oiled occasionally and never be allowed to get under the sand, as we occasionally see them. Nor should one be considered unless the management is prepared to give it a fair chance in the way of seeing that the sand is properly tempered, and the operator otherwise encouraged. To the green laborer on a machine cold sand will convey the impression of dampness to the touch, and warm sand the reverse, and until experience has taught him to discriminate between good and bad temper others should advise him.

What class of castings are adapted to machine molding? The answer to this question depends much on the ingenuity and persistence of the pattern maker and the force of the management back of him. In one foundry indifference may limit the profitable range by one-half, and in another enthusiasm may carry one too far. It is safe to assume that nearly all castings molded in a two-part flask are good work for machine molding. Irregular joints are as well made on a machine as by hand; the only question to settle is will the number of castings to be made warrant

the cost of patterns? Naturally you will want to know the cost of patterns and stripping plate. It is a hard question to answer, for the reason that cost varies with patterns. When much duplication is called for it is better to have iron patterns. You know pretty well what these cost. We know that the stripping plates cost less than patterns. In considering the cost of patterns we should keep in mind the fact that one pattern or set of patterns fitted to a machine will give an amount of work equal to the product of from two to ten molders, and that these machine patterns call for little or no expense in the way of repairs. It is probable that a cost account kept from year to year would show in favor of machine patterns.

What is the profit from machine molding and how is it made? This is the vital question, in which you are all interested. An answer to the first part would show as great difference in foundries throughout the country as their respective cost accounts now indicate. A few months ago your association appointed committees to investigate competing prices for castings by obtaining bids from different parties for similar work. The resultant quotations seemed to indicate that some foundries were getting rich and others approaching bankruptcy at a rapid pace, yet there might have been enough difference in the cost of these castings to warrant a wide range in prices. The foundry which has spent years in developing a specialty is prepared to make cheap castings. Its patterns are well made, flasks designed to hold a minimum amount of sand and the workmen skilled in this branch of molding; piece work has been followed until the lowest price for molding has been reached; all energies have been devoted to reducing cost on these particular castings. Such a foundry may quote prices which carry a fair profit, but would mean ruin to a foundry less favorably equipped. These conditions have an influence on the economy of machine molding. It is evident that the saving in cost would be less in a foundry where 1000 1-inch elbows are molded per man than where 700 are a day's work. On castings of this kind where minimum cost of hand molding prevails the reduction should be one-half. As castings are larger and molding is more expensive the economy from machine molding is increased. We have cases where the cost has been reduced from 10 to 2.

The gains from machine molding are not confined to an increased product per man. Labor with less skill is used. In the sense that the machine operator need have no knowledge of molding, skill is not required, but in the broader sense the expert machine man is skilled to the extent of being apt in his movements, reasonably careful and knowing just when and how to do it. These qualities are so easily obtained that it makes the labor question comparatively easy.

Machine molding adapts the foundry to trade conditions. In busy times additional help may be given the machines to increase their product, and in dull times this may be reversed. Take, for instance, a 16-inch duplex machine, with flasks 12 x 15 inches, with six 2-inch elbows in a flask. The best product per man would probably come when the machine is operated by one or two men, but this number may be increased to four men with but very slight decrease in the number of molds per man. This particular machine is running on steam fittings. It was shipped, with

another like it, in the early part of the year. We do not know the number of molds it is turning out now, but we do know that the owners wrote us, shortly after it was started, saying that they were then paying 1½ cents per mold for molding, core setting, carrying off molds, closing and pouring. The machine was operated by two men. These people also wrote that these men were then putting up over 250 molds per day, and they could see no reason why they should not mold 350 when they became more used to the work. The sand was all handled with shovels by the operators. In this foundry the blast goes on at two o'clock, which reduces

iron foundries, but in malleable iron and brass foundries, where frequent melts are made daily, the conditions for an ideal system are favorable.

Mr. Taylor then proceeded to describe the machine shown in his drawing, both as regards construction and operation, and greatly interested all present. A discussion followed, after which the secretary introduced John Fleming, a molder in the employ of the Abram Cox Stove Company, Philadelphia, who exhibited a model of a machine for molding plumbers' soil pipe.

"This model," said Mr. Fleming, "represents a machine which has never

Whitney & Sons and his consequent retirement from the foundry business. He desired to thank the members of the association for the honor they had conferred on him by electing him as a member of the committee and regretted that his new business compelled his resignation. On motion the resignation was accepted, with regret, by the association.

Mr. Wanner then made a motion that at the next regular meeting of the association a general discussion on the Wilson tariff bill be entered into. While we may all differ, he said, on that question, the matter may be taken up with the view of educating each other, and not with the view of creating animosity. While some might favor high tariff, others low tariff, and yet others free trade, he thought that on one point all agree, and that point was the important point in connection with the whole thing, that the matter be taken up and put through Congress without delay. The motion was readily seconded and carried.

California Tire Bender.

The Knapp & Cowles Mfg. Company, Bridgeport, Conn., are introducing the tire binder herewith illustrated. The machine is described as having steel fluted rolls so set in bearings that they are easily adjusted to the top one by the hand screws in front, and by the hand wheel underneath being raised or lowered to form a radius of any size, from one foot upward. For fifth wheels and that class of work that is required to be bent edgewise, a groove is provided in the rolls. The wheel is slackened underneath to remove the work.

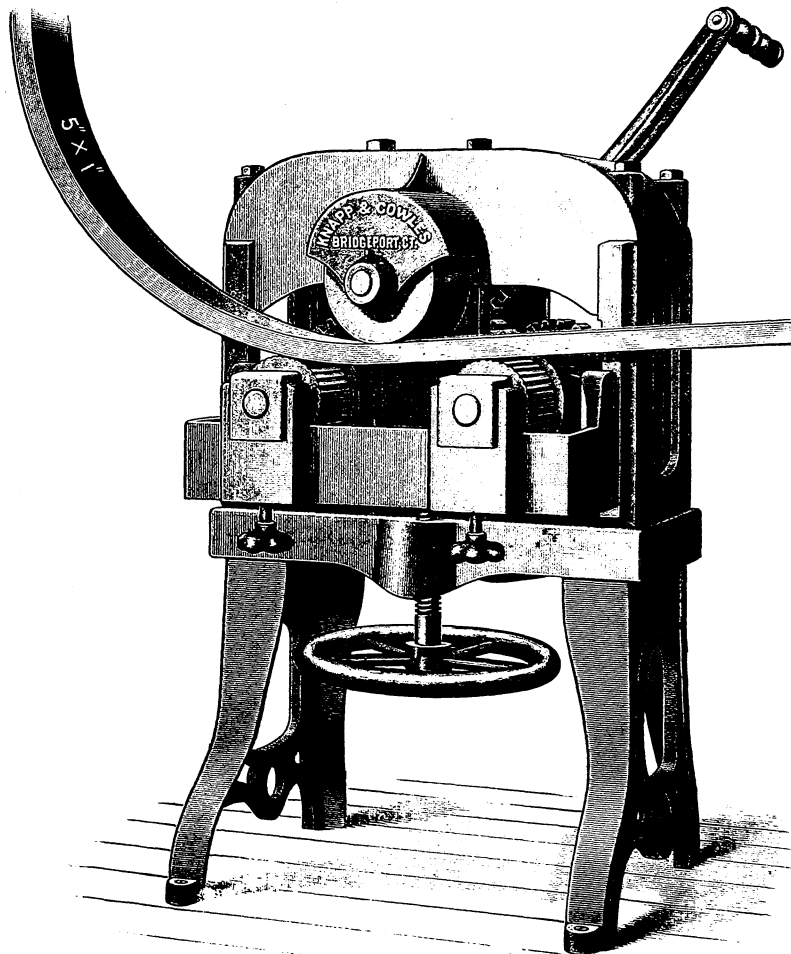
The gearing is so designed that when used for light work more speed is attained by operating the crank on the lower shaft, and for heavy work on the upper shaft.

The manufacturers claim that the machine is simple in construction, of the best material and workmanship, that it is effective in executing work, and is powerful for all classes of work. It is remarked that it can do double work on light tire, and, as an example of heavy work, it is stated that one man bent a 5 x 1 inch tire, as represented in the cut.

The New Phoenix Horseshoe Works.

The Phoenix Horseshoe Company of Poughkeepsie, N. Y., are the first of the large horseshoe makers to start a manufacturing branch in the West. They have just completed a fine plant at Joliet, Ill., which has the same capacity as the works at Poughkeepsie. The old works will continue to run and to supply such trade as can be handled from Poughkeepsie most conveniently, while the new plant will take care of Western trade. A most eligible site was selected at Joliet, in the northern part of the city, on the banks of the Des Plaines River. Here 20 acres were secured, and a very considerable portion of the tract is now covered with most substantial buildings, composed almost exclusively of steel. The Elgin, Joliet & Eastern Railroad has built a branch track into the company's yard, and thus provides facilities for shipping over all roads leading from Chicago, as it intersects them all. The Santa Fe Railroad, however, is expected to shortly make an independent connection.

Seven buildings have been erected for



THE CALIFORNIA TIRE BENDER.

the molding time to six hours. If the molds made by these men were poured for them, and they were given a little help occasionally to handle the sand, they would turn out twice the number.

We have considered machine molding as it is applied to the average foundry without surrounding advantages. The best and most profitable work from this system calls for a rearrangement of foundry and greater division of labor. Continuous pourings should take the place of two-hour heats when practicable, and when not, two heats per day may be substituted. Either of these plans will reduce the number of flasks required by one-half. The machine should be run ten hours per day and the molds should be poured by other help. There should also be a force to take out castings and handle the sand. This will reduce the skill and judgment needed in each workman to a minimum and will make them proportionately more efficient. This problem calls for change in gray

been tried in actual use, not one having yet been built. As will be seen, it consists of a stationary follow board with a sliding jacket worked by two connecting rods operated by a lever. The machine is covered with an inclosed flask. In operation the jacket is raised above the pattern line or the follow board, is filled with sand, and the flask put on and locked. The levers are then pulled down, the flask taken off, and the process repeated for the other flask. It is intended also for use on soil pipe fittings or any work that a two-part flask will make. The sand in the machine," he said, "can be regulated to a nicety."

On motion a vote of thanks was tendered to Mr. Tabor for his interesting paper, and to Mr. Fleming for his model and description.

L. B. Whitney tendered his resignation as a member of the Executive Committee, such resignation, he said, being necessary on account of the severance of his connection with the firm of A.

manufacturing purposes, together with a very handsome office building. The manufacturing buildings comprise a puddle mill, bar mill, horseshoe department, comprising three buildings, engine and boiler house and machine shop. The puddle mill is a steel fire proof building. The main structure is 156 x 76 feet, with a lean-to 76 x 40 feet. The lean-to contains the puddling furnaces and a 20 inch three-high train, suitable for rolling either iron or steel, and a squeezer. The bar mill occupies a building 144 x 121 feet, erected with a clear span and no obstructing columns, standing 22 feet to the eaves and over 50 feet to the deck lights in the center. Three trains have been installed in this building, arranged in a straight line, with room for a fourth train. Each train is run by a Porter-Allen engine, 14½ x 24 inches. The trains are so laid down that two engines stand together and can thus be attended by one engineer. Three heating furnaces stand near the trains, each having an overhead boiler. All pipes are underground in a conduit built expressly for the purpose, permitting ready access to any part of the pipe system. A separate cooling bed is arranged for each train, with shears at the foot of each bed.

Next comes the building in which the billets are heated and the shoes formed, 200 by 70 feet. It contains ten furnaces, with room for four more. A set of horseshoe machinery stands in front of each furnace. Here the straight billets of suitable length are bent and pressed into proper shape. Connected directly with this building and opening into it at one end is a stone structure, 140 by 56 feet, the roof being entirely of steel, in which the shoes are punched, finished and assorted, ready to be keged. The floors of both these buildings are paved with vitrified brick and iron plates. Power is supplied from an engine house standing between the bar mill and the shaping room. The size of this building is 70 by 40 feet, and it contains two Porter-Allen engines, one being 14½ by 24 inches and the other 10 by 12 inches. The pumps, blowers and dynamo are located in this building. An electric light plant will shortly be installed in this house. Three Worthington pumps are in use, one for pumping from a pond to a 50,000-gallon tank built on a staging outside, and the others for boiler feeders, elevators, &c. Two Babcock & Wilcox boilers are in an adjoining room, each rated at 250 horse-power.

A stone storehouse, 200 x 80 feet, with roof entirely of steel, adjoins the finishing room. A hydraulic elevator in the latter room is used for hoisting shoes up to the level of a platform in the storehouse. The platform has various passageways running from it and passing over bins in which the different kinds of shoes are separately stored. Railroad tracks run along one side of this building, the roof of which overhangs the shipping platform. The latter is on a level with the car floors. Seven cars can be loaded at one time, the doors being an exact car length apart.

The machine shop, 70 x 33 feet, built of stone, is well equipped with planers, drills, lathes, pipe cutters, &c., enabling the company not only to handle repairs and avoid delays, but also to build new machinery.

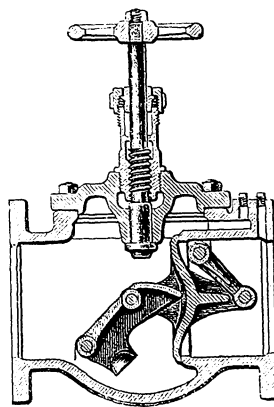
All these buildings have been arranged according to a most carefully conceived plan. They are not only conveniently located for present conditions, but they are so placed that they can easily be extended when required,

so as to increase the capacity of the plant at any time without disturbing its harmony of arrangement or interfering with its operation.

The office building is constructed of stone, with an ornamental tile roof. The inside finish is of Georgia pine. It contains a large counting room, private office, drafting room and storeroom, and is heated by steam from the mill. The same thoroughness and careful regard to appearances as well as usefulness are shown in every part of the plans, the office as well as mill buildings demonstrating the attention given to every detail. The plant will be in full operation either toward the close of this month or in the beginning of next month.

The Schutte Balanced Horizontal Check Valve.

The Schutte check valve is intended for use principally between engines, pumps and vacuum pans and a condenser, though it is as well adapted for



The Schutte Balanced Horizontal Check Valve.

use in such places where a check valve is required.

The valve, when applied in the exhaust connection from an engine to the condenser, is intended to prevent a back flow of water from the condenser to the cylinder. The desirability of a safety appliance of this kind is well understood.

The inclined suspension bar to the left in the engraving has a tendency to open the valve, while the inclined supporting bar to the right has an equal tendency to close it. The small counterweight on the supporting bar, as shown, compensates for a possible deviation from the level position of the valve, and also adds a permanent slight excess of force to close. On the right hand a boss is provided for the convenient attachment of a vacuum breaker or air admission valve. The two passages appearing in this boss correspond to passages in the vacuum breaker. When a vacuum breaker is needed it may be attached to the check valve by means of a gasket and two tap bolts, for which threaded holes are provided. The passages in the boss on the valve are also threaded and closed by screwed plugs. Where no vacuum breaker is needed, the threaded passages may, on removal of the plugs, be used for the attachment of a vacuum gauge. The valve is made in sizes ranging from 1½ inches to 20 inches by L. Schutte & Co. of Philadelphia.

The Golding Fire Proof Floor.

A series of experiments have been made lately at the Howard Iron Foundries, South Boston, with the Golding fire proof floor. At the suggestion of Capt. John S. Damrell, inspector of buildings, a section of the flooring in question was constructed in the foundry yard. It consisted of a section of single floor arch, with a span of 16 feet, making a surface of 62 square feet, resting upon iron girders, which were supported by four heavy timber blocks imbedded in the ground and rising above the surface about 4½ feet.

In making this arch, after the forming under boards were in place, the expanded metal, which is composed of meshes of steel, was stretched across and the cement concrete poured in and leveled up to the required height, the metal being thus thoroughly imbedded in the concrete. On this was placed a single layer of boards. This was left to set and harden for about three weeks, though it is well known that it takes at least as many months for such concrete to even approach a maximum hardness and tenacity.

Tuesday evening pig iron was piled upon this floor arch to an amount equal to 750 pounds per square foot, or 46,500 pounds. Later an additional weight of pig iron was placed upon the arch of 9300 pounds, bringing up the total weight to 900 pounds per square foot. Up to 1 o'clock, even with this great load on, no perceptible deflection was noticed. When the time set for the exhibition arrived an additional weight of about 72½ pounds per square foot was put on, which brought the total load of the section of floor arch up to 60,310 pounds, or about 972½ pounds per square foot of surface.

Under this great weight the arch began to give, but the movement was at first slow, and even when it went down it was a gradual and easy descent—not a sudden disruption and a crash. When its central part reached the ground it still held together, and its ends did not leave the supporting iron cross beams.

Employees of the Pennsylvania Railroad are being instructed in the use of a new Westinghouse automatic emergency air brake with which the cars of that road are to be equipped. A box freight car has been fitted up with the brake at the Altoona shops and sent over the lines of the company in charge of a corps of instructors. The car is fitted with 24 air brake cylinders, such as would be the equipment of an engine and train. These are arranged in a series within the car so that their working may be readily seen and explained. The emergency device is an attachment to the ordinary air brake, and by its use the brakes are applied quicker than the eye can follow the movements of the pistons in the series of cylinders.

Engineers who have inspected the levee now being built along the Gila River report that the Colorado River can be made navigable from its mouth to the Grand Cañon, a distance of 700 miles.

The ready sale last week of \$1,225,000 of 3 per cent. stocks and bonds of New York City at 100.38 is regarded as a sign of returning confidence in commercial circles. This is the first time since the depression began that the city's securities have sold at a premium.

American Society of Mechanical Engineers.

A valuable paper on
The Expansion Bearings for Bridge Superstructures
was read by George S. Morison of Chicago:

Among the special details of bridge construction one of the most important is the provision for changes of length due to temperature; and while this is a provision which is nearly always made, it is, unfortunately, one of the details on which least care is bestowed. For many years I have observed the defects of the expansion bearings of bridges as generally constructed, and it has seemed to me that the time has come when the attention of engineers should be called to these defects and to the arrangements which, I believe, will obviate the worst existing difficulties.

When a structure which changes its length rests on supports the distance between which is practically unchangeable, provision must be made for that change of length. When metallic structures rest on masonry piers some attempt at such provision is universally made. The refinement of modern theory would say that like provision should be made for wooden structures resting on masonry, as timber changes its length under strains more than iron does. In practice no such provision is made in wooden bridges, and it is best that none should be made. In practice this provision, though always made in metallic bridges, seldom operates as it should.

The older devices for this purpose were of three classes—sliding plates, rockers and rollers.

The sliding plate was the simplest of all. It consists simply of a smooth planed surface of metal on the masonry, and a like surface at the bottom of the end post, one sliding on the other. So long as the plates could be kept lubricated this worked pretty well; the difficulty in lubricating, however, was often fatal, and though there are instances of important bridges, of spans of considerable length (like the deck spans of the Louisville bridge) which have done good service with sliding plate bearings, the practice has not met with favor. Sliding plates, however, are generally used under riveted structures of moderate length.

Rockers are an attractive design, and have some advantages over other plans. The rocker is, in fact, nothing but a section of a wheel, the weight being carried on the axle and the wheel rolling on its circumference. There are two objections to a rocker bearing—the great weight that must be carried on the axle and the friction on this axle. The friction causes more or less sliding motion; the result of this sliding motion is to work the bearing gradually toward one edge of the section, so that at length the rocker falls over. Rockers were used considerably 25 years ago. They are now almost entirely abandoned.

Rollers have always been the favorite device. It is the one arrangement in which friction can virtually be eliminated. There are no sliding surfaces; the top bearing rolls on the rollers, and the rollers roll on the lower bearing. If perfectly constructed the arrangement must always be perfect. Such has not proved to be the fact, and in many instances the motion on the rollers is less than on the sliding plates.

The old roller bearings differed from

the old sliding plates, simply in that a nest of rollers was placed between the two plates. The lower bearing was a flat cast iron plate on masonry; the upper bearing was the planed surface of an end post, usually of cast iron; the nest of rollers was between. There was no provision except accuracy of workmanship to insure parallelism of the two plates, and even the slight deflection of the truss due to the passage of a train would disturb this parallelism; the necessary result was that some of the rollers were greatly overburdened. This practice, however, was abandoned many years ago, and all the better designed bridges now transfer their weight to the rollers through bolsters, which, supporting the trusses through the end pins, are free to rock; one of the serious defects of the older roller bearings has been thus removed.

Mr. Morison then described the bearings of several bridges of his own design, and said of the bridge across the Mississippi at Memphis:

The central span of this bridge is 621 feet long, and as a cantilever arm projects from each end of this span the weight carried at each end corresponds to nearly double the weight of the half span. Making no allowances for changes of length due to strains, the provision for temperature alone required a possible movement of about 8 inches, while the actual dead weight carried on each bearing was 2,454,000 pounds, and the total dead and live load 4,036,000 pounds. In other words, I had to prepare an expansion bearing with a possible movement of nearly 10 inches which should roll freely under a weight of 2000 tons. This is probably the largest expansion bearing ever built.

As the piers were tall and slender it seemed necessary to reduce the friction on this bearing as much as possible, and I decided to use large segmental rollers. The rollers were made of forged steel, 15 inches in diameter, and placed 6 inches between centers, the sides being planed out hollow so that the rollers would shut into each other, after the European practice. The under bearing consisted of a wall plate casting made in four sections, the whole being 10 feet square. On this wall plate are the rail plates, one on each side of the center line, each rail plate being formed of 15 rails riveted to a heavy plate below. A solid steel plate 4 inches thick is bolted between the wall plate castings and extends above the top of the rail plates, thus forming a central guide for the rollers. There are 30 rollers in all, 15 on each side of the central plate. The sides of the rollers are planed and the cylindrical rolling surfaces are polished. Each roller has two holes bored completely through it, through which pass bolts made of cold rolled shafting, these bolts uniting the rollers on the two sides so that they will roll together. The lower tier of bolts pass through side plates with square ends and the upper tier of bolts through side plates with hook ends; before the rollers can turn over the hooks of the upper plates strike the square ends of the lower plates and the motion is stopped. Graduated scales with sliding verniers were fitted on the lower plates, and brass pins were inserted in the hook plates, this being a special refinement put on for the purpose of reading the actual expansion, and from this reading some interesting results have already been obtained.

Above the rollers is the bolster, which

it was originally proposed to make of two large steel castings with a guide plate between, like those between the castings of the wall plate; so much difficulty was experienced, however, in getting sound steel castings that the plan was changed and the bolster was built up of steel plates and I-beams, a central plate being so inserted as to make a guide rib between the rollers. On this was placed a large steel casting, which carries the 14-inch pin on which the entire weight of the superstructure is thrown.

As an extra precaution a steel lock plate was placed between the two sets of rollers; before any great strain can be put on the bolts which fasten the side plates to the rollers the bolster will strike one end or the other of this lock plate, and all further movement will cease; it is not likely that this will ever occur, but it was thought best to provide for it, so that in case of some special strain tending to move the pier, the pier will bend before there is any danger of the expansion bearing being thrown down.

The result of this arrangement has been satisfactory. The bearing is sensitive to all changes of length, it forms an accurate metallic thermometer 620 feet long, and the movements due to the passage of trains and the changes of chord lengths under strains are accurately measured.

Observations on these bearings showed that some further changes could be adopted to advantage. The cast iron wall plates and the rail plates were all that could be desired; the large segmental rollers with the hook side plates were good, but could be improved; the pin connection between the bolster and the truss was good as far as it went, but was defective in that it provided for rocking in one direction only, whereas irregularities of workmanship or other disturbances might destroy the parallelism between the pin and the rollers, and thus make very unequal bearings.

To remedy this last defect I decided to make the rocking of the bearing entirely independent of any of the pin connections in the truss, and to put below the chord line of the truss what I have termed a rocker plate, which is a polished steel plate with two cylindrical surfaces on top and bottom at right angles to each other. The plate bearing on the rollers is a steel casting, with a turned socket in the center, in which the rocker plate fits, and above the rocker plate is another steel casting with a turned socket below. The upper casting is, therefore, free to rock in any direction without disturbing the lower casting.

A Device for Drill Jigs

was described by B. Cruikshank of Brooklyn.

The following simple plan is submitted as leading to good results in the making of drill jigs. This is a well-known device in some shops, but not being universally used, a brief description of it would perhaps be of interest.

Where two holes are to be placed in the jig in the same flat surface, at a given distance from center to center, they can be quickly and accurately located by the use of hardened steel bushings ground to a known size on the outside, and lapped out to very accurately fit the drills and reamers which are standard for the tits of counterbores in use in the shop. By using the same tit size for several sizes of counterbore the number of bushings necessary for all round work could be considerably kept down.

These bushings should be made with a flange or other projection, so that with clamps they may be temporarily fastened to the jig, the distance from the outside of the one to the outside of the other measured with micrometer or vernier caliper, and the holes for the counterbores drilled and reamed.

This is not new nor even my own device, but is so handy that it should be more commonly used in shops where sufficient jig making is done to warrant the expense of a few bushings with counterbores to fit.

In a paper by Fred. W. Taylor of Philadelphia on

Notes on Belting

many conclusions were drawn as to the use of belting so as to obtain the greatest economy and the most satisfactory results.

The number of square feet of double belt passing around a pulley per minute required to transmit 1 horse-power is 80 square feet of oak tanned and fulled leather belts, or the number of lineal feet of double belting 1 inch wide passing around a pulley per minute required to transmit 1 horse-power is 950 feet of

The most economical average total load for double belting is 65 to 73 pounds per inch of width—i.e., 200 to 225 pounds per square inch section. This corresponds to an effective pulling power of 30 pounds per inch of width, and with rules No. 1, given above.

Double leather belts, when treated with great care and run night and day at moderate speed, should last for seven years, when under average total load of 111 pounds per inch width, or 358 pounds per square inch section.

They should last for 18 years when under average total load of 54 pounds per inch width, 174 pounds per square inch section.

A double belt will stretch $\frac{1}{10}$ of 1 per cent. of its length before requiring to be tightened, when subject, according to ordinary rules, to a total load of 111 pounds per inch of width, and giving an effective pull of 65 pounds per inch of width. A double belt, with total load of 54 pounds, effective pull of 26 pounds, stretches $\frac{1}{10}$ of 1 per cent. before requiring tightening. In a carefully conducted experiment between different types of leather belts, made in a machine shop, lasting nine years, between 40 and 50 belts being used, the

side of 10,000, and I found out more in other people's shops than I found in my own. There are lots of machines being built that are going to start right off if the man running it remembers that it is a new infant being put right into active practical work. In regard to the time lost, I admit that the object of time in all factories is an important one of all things, but the time lost in shop practice is not simply in belts, but because the superintendents, managers and other officials are devoting a little too much time to what we might expect from college graduates, instead of seeing that the work is kept up and leading men on to better victories and better results.

The author says: "I have found in my experience, taking the running conditions of the two kinds of belts in daily service, without comparisons as to length, as mentioned in article 65, that horizontal running shifting belts in machine shop work usually last about five times longer than the vertical cone belts, while in wood working plants, where the service is harder and more furious, they last nearly three times longer than the vertical belts." The chief reason why the shifting belts

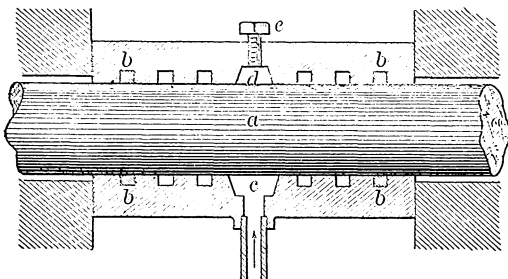


Fig. 1.

Cowe.

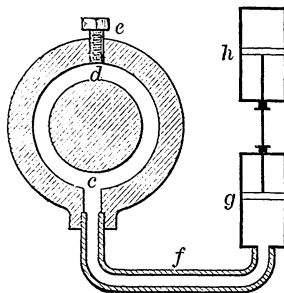


Fig. 2.

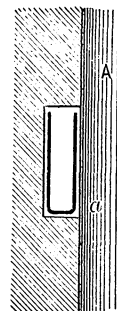


Fig. 3.

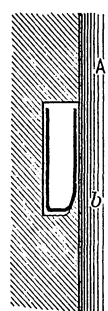


Fig. 4.

Raynal.

PACKING FOR HYDRAULIC MACHINERY.

the same belt. The belt speed for maximum economy should be from 4000 to 4500 feet per minute. The best distance from center to center of shafts is from 20 to 25 feet. The faces of pulleys should be about 25 per cent. wider than their belts. Belts are more durable and work more satisfactorily made narrow and thick rather than wide and thin. It is advisable to use double belts on pulleys 12 inches diameter, or larger. It is advisable to use triple belts on pulleys 20 inches diameter, or larger. It is advisable to use quadruple belts on pulleys 30 inches diameter, or larger.

When practicable, belts should be tightened by moving one pulley away from the other. Countershafts should be mounted on frames and raised in tightening vertical and diagonal belts.

Belt clamps having spring balances between the two pairs of clamps should be used for weighing the tension of the belt accurately each time it is tightened.

When it is impracticable to accurately weigh the tension of a belt in tightening it, it is safe to shorten a double belt $\frac{1}{4}$ inch for every 10 feet of length, if it requires tightening, when working, according to the ordinary rules, under a total load of 111 pounds per inch of width and giving an effective pull of 65 pounds per inch of width. If it works under a total load of 54 pounds and an effective pull of 26 pounds, it is safe to shorten the belt 1 inch for every 10 feet of length, when it requires tightening.

oak tanned and fulled belts showed themselves to be superior in all respects except the coefficient of friction to either the oak tanned not fulled, the semi-rawhide, or rawhide with tanned face.

Belts of any width can be successfully shifted backward and forward on tight and loose pulleys. Belts running between 5000 and 6000 feet per minute, and driving 300 horse-power, are now being daily shifted on tight and loose pulleys, to throw lines of shafting in and out of use.

Shifting belts are much to be preferred to cut off couplings or friction clutch pulleys for throwing heavy lines of shafting in and out of use.

The best form of belt shifter for wide belts is a pair of rollers twice the width of belt, either of which can be pressed on to the flat surface of the belt on its slack side close to the driven pulley, the axis of the roller making an angle of 75° with the center line of the belt.

The writer gave his reasons for these rules (only a few of which we quote) and said they were the result of a long series of experiments and observation.

Discussion.

W. S. Rogers presented a written discussion, from which we take the following:

I have started several new shops, and I think I have had the privilege of roving over this country of seeing the in-

last so much longer than those used on cones is that cone belts have about three times more work to do and receive about ten times more abuse while doing it than their brethren who drive them. I know of nothing more destructive to belting in service than cone steps and the methods used for shifting belts on them. There is one point in regard to the life of belts that we seem never to take into consideration when discussing their extended or abbreviated lives, and that is the temperatures through which they have to pass in performing their functions. I have found that a belting running through varied changes of temperature will cause considerably more trouble and obstruction to manufacture and have a much shorter life than one running under more favorable conditions.

In speaking of the exact point of tension at which belts were just able to do their work, the author says: "This point was fixed by each belt for itself by giving indications that it was about to slip seriously." Now, I would like to ask what the sign or indication is? The only evidence I have been able to gain from a belt as to its intentions to slip was after the slip took place. In this same paragraph we read that "the shifting belts rarely if ever slip," and bearing this in mind I read on in the next paragraph in regard to the shifting belts that "they were taken up because they had stretched so much that they began to flop and jump about to

such an extent as to be in danger of damaging themselves." Now, I have always found that a belt was slipping considerably when its actions were as here described and the tension was to zero, and not only is it damaging itself, but it is also injuring the smaller belt it is driving to a serious extent.

On page 23, the author states, in paragraphs 80, 81, 82, 83 and 84, the rules he has adopted and used for several years, and when I come to 83 I make a few figures to see how I would have come out in equipping my plant this autumn, provided I had followed these rules.

My three line shafts have a rotative speed of 200 per minute, which is a little above the average in machine shop practice. To have obtained the economical belt speed called for in paragraph 83 I would have been compelled to use pulleys 7 feet in diameter and hangers having 45-inch drop, at least. As the ceiling is 16 feet from the floor (which is a foot or two more than usual practice in the great manufacturing plants) the lower side of the belt would have been only 9 feet 9 inches from the floor. If I had belted to a heavy boring mill whose countershaft pulleys are only 28 inches diameter and are figured to run at 125 revolutions per minute by the builders, I find that I would have required tight and loose pulleys over 11 feet in diameter, and the tool builders would have had to also furnish me with hangers for the counter having 6-foot drop. This would have brought the lower side of the counter belt to within 5 feet of the floor, and should I have carried this plan out all through the plant I should have had to rent space elsewhere to work in. To have run a triple cylinder molding and flooring machine to carry a belt speed of 4000 to 4500 feet to the countershaft whose builders call for a pulley speed of 1000 revolutions per minute I would have required 16-inch pulleys on the counter instead of 10-inch ones furnished. My shafting and hangers would also have had to be much stronger to carry this excess weight, and the first cost would have given the stockholders paralysis.

Friction clutches given the same care and attention that is or rather should be expended on loose pulleys and belts will give more satisfactory results on the belting and throughout the shop generally. I would much rather have the wear and burn from slow starting come on the wooden shoes of the clutches than on the belting. The wooden shoes are cheap and easily replaced when the life is worn out of them from friction slipping, while I know of no way of putting it back into the belt. Friction clutches are superior things in case of accidents, as has been proved thousands of times for the benefit of employer and employee and machinery as well.

What is the best mode for packing the rods and plungers of hydraulic machinery, particularly under high pressure?

In the discussion of this question Mr. Coxé described very fully and illustrated by means of sketches on the blackboard, which we reproduce, the method which has been most successfully followed at his works for packing piston rods intended for pressures up to as high as 400 pounds. These worked so well that they had been placing them on all their pumping machinery as rapidly as possible. The construction here followed will be understood from Figs. 1 and 2, in which *a* is the piston rod, surrounding which is a sleeve having

six small annular grooves, the end ones *b* of which contain ordinary piston rings, which are sprung in, the others being left empty, as indicated in the drawing. The groove *c d*, shown in section in Fig. 2, is formed in this sleeve, its upper portion being provided with an opening closed by the screw plug *e* and its lower portion being connected with the pipe *f*. The lower portion of this groove is wider than the upper. Connected with the pipe *f* is the cylinder *g*, the piston of which is operated by pressure admitted to the cylinder *h*. The piston *g* is removed from its cylinder and the latter filled with tallow cut into small pieces, when the piston is returned to its place and the pressure admitted on the upper side of the piston of the cylinder *h*. This forces the tallow through the pipe *f* and into the groove *c d*, surrounding the pump piston rod. During the operation of the piston rod the tallow finds its way into the empty grooves and serves not only as a perfect lubricant, but also assists and effectually packs the piston rod. The extreme simplicity of the device and its efficiency were dwelt on to some length by Mr. Coxé.

Alfred H. Raynal illustrated by means of the drawings, Figs. 3 and 4, the necessity for correctly forming the recesses to contain cupped leather packing intended for packing rods working under high pressures. When the recess is made with a right angle as shown at *a*, Fig. 3, the pressure upon the inside of the U-shaped leather will cause the latter to buckle in this corner and destroy it quickly. This joint should be made as indicated at *b*, Fig. 4, as sharp as possible and should be curved in order that there should be no tendency of the leather to buckling and that when properly constructed in this way he had found packing of this description to work well.

The high pressures produced by stopping the flow of water through a pipe, even when the velocity is small, were shown in "Some Experiments on the Effect of Water Hammer," described by Prof. R. C. Carpenter of Cornell University. A paper by the same author was presented on "Constants for Correcting Indicator Springs that Have Been Calibrated Cold."

Use of the Indicator for Continuous Records in Dynamometric Testing.

By Wm. S. Aldrich, Morgantown, W. Va. In introducing this subject, the writer said:

For variety of purposes the steam engine indicator is probably one of the most serviceable spring pressure recording instruments at the command of the engineer. It has reached a high degree of mechanical perfection for its particular use in steam engine testing. Notwithstanding its well known defects when applied to this purpose, it seems only possible to perfect further its mechanical construction, so long as its typical piston mechanism is adhered to. Still, this is not an inherent objection to the use of the indicator in some other lines of recording work, and the purpose of this paper is to show how it has been so applied in power testing with a dynamometer. It is sometimes better to make use of an instrument which has been brought to a high state of perfection in one field of work than to undertake the development of new and untried forms of apparatus for limited and usually special tests. Taking the indicator, therefore, as we find

it, and not delaying work in which it may be used to advantage till it (or a similar instrument) becomes what it ought to be, the steam engine indicator will be found extremely serviceable in obtaining short continuous records in power tests.

Almost all tests of this character may be reduced to the measurement of a more or less variable pressure, depending on the amount of energy being absorbed by the dynamometer. This pressure is usually measured as a pressure on a platform scale, or by the maintenance of a weighted lever in a position of equilibrium, or by the simple pull on a spring balance. But this pressure may be transferred or transmitted to any other instrument designed for recording variable pressures, as the indicator, for instance. In some cases simple mechanical connection may be used, while in others hydraulic connection will be found desirable.

Mechanically transmitting the pressure from the arm of the dynamometer, by a linked connection, to the indicator piston, enables us to turn the indicator into a recording spring balance. In this method its piston mechanism is not in the least objectionable, serving merely as a guiding mechanism.

In the transfer of the pressure from the dynamometer arm to a diaphragm, which in turn presses upon water, oil or mercury, in a closed vessel, and thence, by pipe or tubing, to the cylinder of the indicator, we make use of it as a recording pressure gauge. Small variations in pressure, slowly increasing or decreasing, yet of comparatively short duration, are not faithfully recorded on account of the retarding effect of friction of the indicator piston; but the leakage past the piston will be the least. Rapid and extreme variations in pressure, as well as extreme pressures, maintained for any length of time, are sure to result in more extended leakage, even when mercury is used under the indicator piston, as arranged for the form of the "U" manometer. When the greatest sensitiveness of the indicator is most desired (with small pressure variations) it is least obtained. It would, therefore, be much better to use some form of diaphragm, or closed tube pressure recording gauge. It should be capable of enduring much more rapid and extreme fluctuations than any on the market at present.

The author then described the method he had followed in using the indicator in this way and gave some of the results.

A New Form of Prony Brake,

designed by Prof. R. C. Carpenter of Cornell University, was then described:

The brake consists in each case of a tube of copper, with an elliptical section, which nearly encircles the brake wheel. Outside the copper tube is an adjustable band or belt of sheet steel, which prevents the copper tube from expanding. Water pressure is applied to the copper tube by means of hose connections made near the center of the wheel to water pipes, the amount of pressure being regulated by throttling the admission and discharge valves. As the external diameter of the copper tube cannot change, the internal pressure causes the inner surface to rub against the wheel, producing the friction which is used to absorb the work. To prevent the wearing of the inner surface of the copper tube a thin sheet of steel or Russia iron is inserted between the tube and the brake wheel and connected to the brake so as not to revolve.

This brake has proved very satisfactory; the work is readily absorbed by varying the opening of the supply and discharge valves, and no trouble has been experienced on long runs from heat or irregular friction of the brake.

In the figures which follow, the principal parts and dimensions are as follows:

Fig. 5.—Elevation of wheel with attached brake. Wheel, 4 feet diameter, 12 inch face; A, supply pipe; B, discharge pipe; C, brake; D, sheet iron liner; F, external strap sheet iron; G, adjusting bolts in external strap; H, arms of brake riveted to external strap; J, support for brake arms, to be carried on platform of weighing scale.

Fig. 6.—Section of brake and rim of wheel. C, brake, elliptical section; larger diameter, 12 inches; shorter

succeeds in securing motion sufficient to adjust the tension on the brake.

The general method of securing the adjustment is shown in the diagrammatic form, Fig. 7, in which A C and B C are the brake arms. These rest on the end of a horizontal lever, K C. This lever is supported at D by a knife edge on the fixed support D E. A movement weight, F, is placed on the arm of the lever at any point needed to give the required brake load. If the brake load is too great, the pressure at C is greater than at F, and the point K of the lever rises. On the other hand, if the brake load is too small, the pressure at F is greater than at C, and the end K of the brake arm falls.

The motion at this point can readily be utilized to decrease or increase the tension on the brake, as required. In

A Comparison of the Mean Effective Pressures of Simultaneous Cards Taken by Different Indicators.

From the latter paper we take the following conclusions derived from the tests made by the author:

1. With correctly fitted pistons in the indicators there need be no greater error involved in their use than that which occurs in measuring the hot scales of their springs.

2. A leaky piston is much more reliable than one that is too tight a fit. A piston that will fall through the cylinder by its own weight may be too tight and produce errors due to undue friction. The friction of an indicator piston should be so small that there will not be over the thickness of a very fine pencil line between the lines obtained for a rising and falling steam pressure in the tests to determine the hot scale of the springs.

3. The greatest difference found between two indicators with correctly fitted pistons for the mean effective pressures of cards taken at one-quarter cut off was, as a maximum, 0.9 per cent. in four indicators tested, and the great-

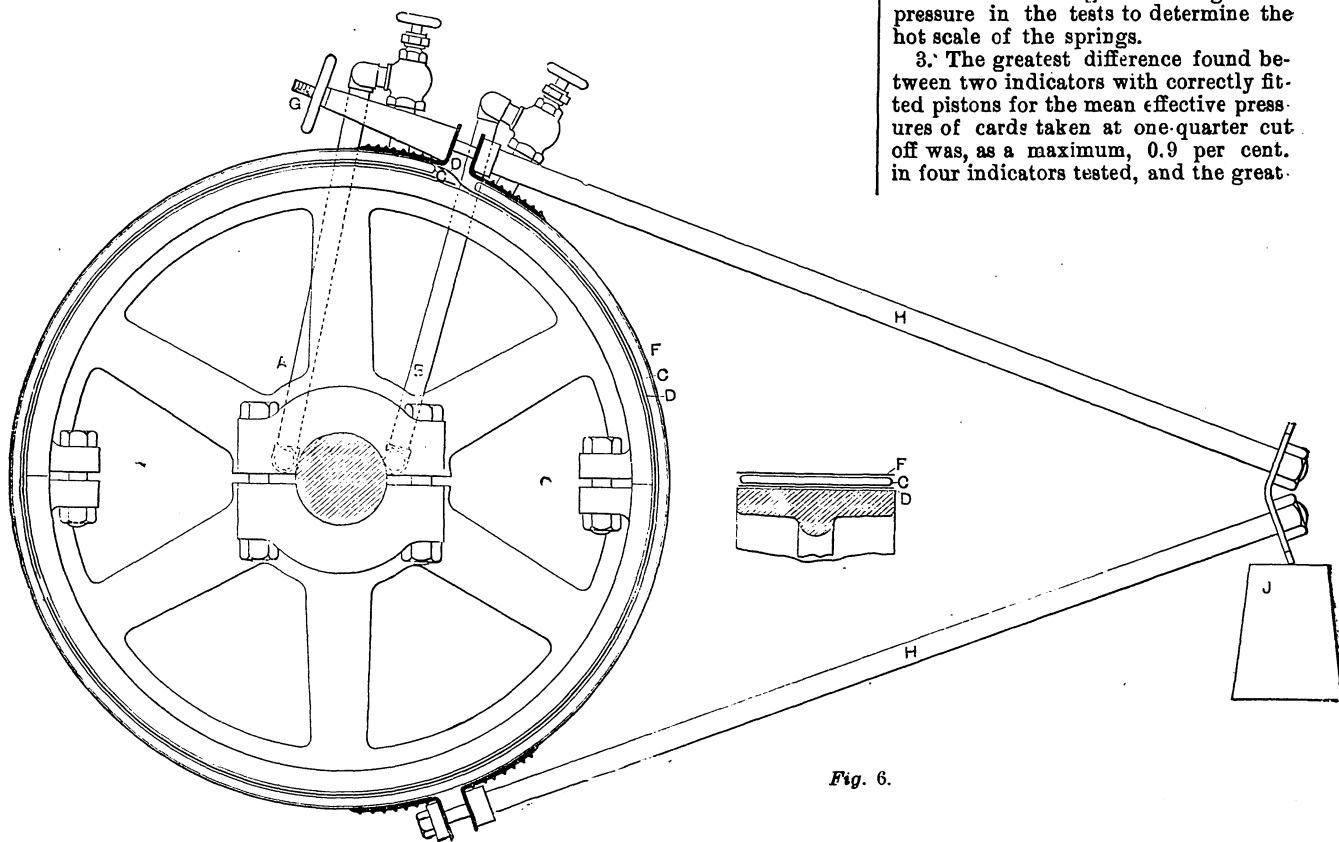


Fig. 5.

THE CARPENTER PRONY BRAKE.

diameter, $\frac{1}{4}$ inch; F, external strap; D, sheet iron liner.

Another merit, which in some cases may be of little moment, but which was of considerable importance at the time of its erection, was the fact that the first cost was small, the brakes not costing over \$50 each.

Prof. C. W. Scribner designed a self-regulating device which I consider of great merit, but which, because of pressure of other work, has not yet been applied to the brakes just described. There is, however, no doubt of the effectiveness of the design, and its description is therefore here given.

So far as the writer knows, every previous device for automatic regulation of the work absorbed by a brake requires the rotation of the wheel to be such as to tend to move the free end of the brake arm in an upward direction. This is oftentimes objectionable, and some times an element of danger. In this case Professor Scribner permits a downward motion of the brake arm, and yet

this case this motion will be utilized to regulate the opening of the supply valves and to vary the pressure on the brake. The weight F can also be utilized to weigh the load. The detailed drawings for this purpose are shown in Fig. 8.

The principal parts are as follows:

A, supply pipe; B, discharge pipe; C, brake; F, external sheet steel strap; G, adjusting bolts in external strap; H, arms of brake fastened to external strap; M, weighing lever; W, weight; O, knife edge between lever and stationary support; N, knife edge between brake arm and lever; P, hand wheel to adjust load on brake.

At this stage of the proceedings papers were presented by William A. Pike of Minneapolis on "Steam Piping and Efficiency of Steam Plants," and by Prof. D. S. Jacobus of Stevens Institute on

est difference in the measurement of the mean height of the diagrams for any two indicators was 0.005 inch. This was for comparative tests in which the average of either 12 or 24 cards was taken. The greatest difference between any single pair of indicator cards taken simultaneously was 2.5 per cent. of the mean effective pressure and the corresponding difference in reading the mean height 0.017 inch.

4. The greatest difference found between any two indicators with correctly fitted pistons for the mean effective pressures of cards having one-fortieth cut off, so that a loop was formed below the atmosphere line, was 0.6 pound per square inch, and the greatest difference in the measurement of the mean height was 0.010 inch; or, adding opposite signs, 0.017 inch. The presence of a loop causes the effect of friction and lost motion to be a maximum, and the above differences are therefore greater than were found in cards having no loop.

5. The variation of the weight of the moving parts within the limits now employed by the makers of the standard instruments does not affect the accu-

as everything was prepared at that time to complete the test, it was finally decided to make same, if for no other reason than to demonstrate what the

pounds per square foot of grate surface per hour, the efficiency obtained was 71 per cent.

A Crucible Furnace for Burning Petroleum

was described by W. E. Crane of Waterbury, Conn.

The furnace is built round as high as the top of the crucible, and 4 or 5 inches larger in diameter. From there up it is built square, and the corners used as described further on.

The pot stands on a support about 6 inches high. If it is a furnace running continually, it is immaterial of what substance it is made, or how solid, provided it will withstand the high temperature.

If a furnace runs 10 or 12 hours only per day it should be made with as little substance as will withstand the temperature and weight. If made solid, the first heat will take longer, as this support must be thoroughly heated through before the bottom of the pot will heat. After the first heat any support will be all right. Fig. 9 shows an elevation of the furnace, which has been rebuilt from one using grates for coal. A brick bottom is put over the grates to preserve them, but one grate should be taken out and a hole left through the bottom, so that the metal can run through if the pot breaks.

Fig. 10 shows a plan of furnace at the top of the pot. Four pieces should be provided of the shape shown in one of these corners, which will rest on top of the pot and in the corner of the furnace, shutting in the products of combustion around the pot below the top. By this means fully 15 per cent. of the fuel will be saved, a much hotter fire secured, and faster work done. A small flue should lead off from the top of this chamber, not over 2½ inches square, either to the chimney or to heater for heating air, or to other system of economizing the heat from waste gases.

When the waste heat is utilized, this construction is essential in melting alloys, especially where spelter or zinc is used, as the fumes would coat over or fill up any economizer. By closing the space at the top of the pot the fumes from the alloys can be carried off through a separate flue. This flue should have from 30 to 40 inches area.

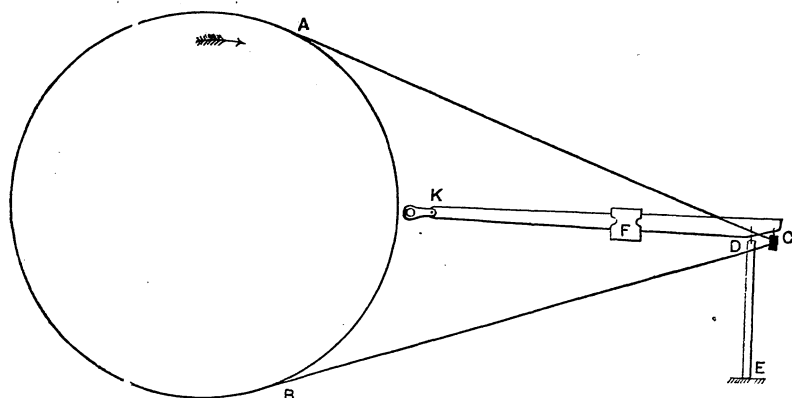


Fig. 7.

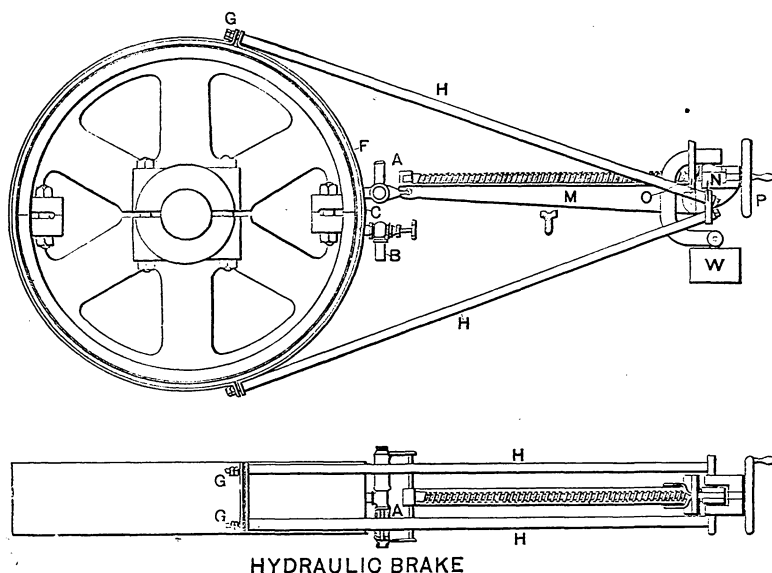


Fig. 8.

THE CARPENTER PRONY BRAKE.

racy of the results obtained by the indicators.

A paper by Charles H. Manning of Manchester, N. H., described the method he had followed several years ago in making a 20-inch steam pipe. It was made of mild steel, riveted, with die forged flanges of the same material, the flanges being riveted and calked.

"A Method of Calculating the Strength of Rim Joints in Fly Band Wheels" was the title of a paper by J. B. Stanwood of Cincinnati.

F. A. Scheffler of New York took for his subject the test of a boiler using grates with small percentage of openings. The openings in the grates in question should have been $\frac{3}{16}$ inch, but they were not more than $\frac{1}{8}$ inch, due to rapping the pattern in the mold and to rough edges naturally resulting from the endeavor to make such small openings. These grates had a total area for passage of air of only 15 per cent. The usual size opening for grates burning the kind of coal used is between $\frac{3}{8}$ and $\frac{1}{2}$ inch, giving an area of from 35 per cent. to 45 per cent. The draft gauge showed 0.46 inch of water, which, while being a very fair draft, was nothing to brag about, considering the grate openings. The writer felt that it would not be politic to make a test of the boiler under the circumstances, but

boiler could do with only 15 per cent. openings in the grates.

The results showed that, with only

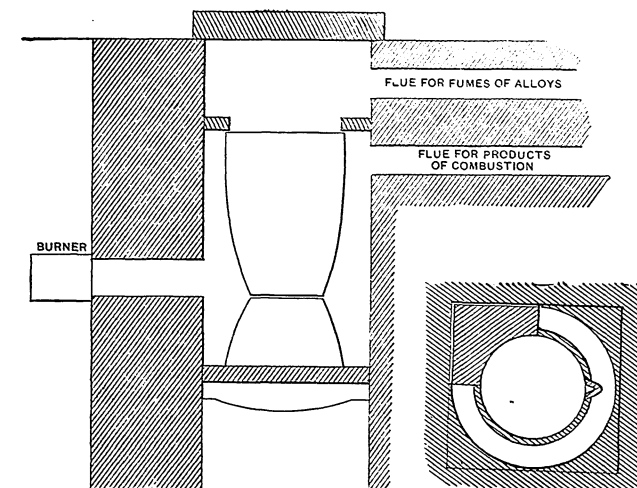


Fig. 9.

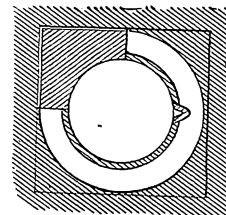


Fig. 10.

CRUCIBLE FURNACE BURNING PETROLEUM.

15 per cent. grate area and with an overload of 60 per cent. above the rated capacity, when burning 24.8

The burner would preferably be an air burner, with as low a pressure as possible. Some burners work nicely

with as low as 6 ounces pressure. All of the air for combustion should be supplied by the blower. With an air burner at high temperatures there is usually a deposit of carbon. This can be prevented by introducing a small jet of steam, preferably superheated. As a general thing this will be found to cause more annoyance than that of removing the deposited carbon. This steam will have a tendency to lengthen the flame, and as a consequence the heat will be less intense, more of the heat passing off into the flame.

There should be a good draft to take off the fumes when using alloys which smoke a good deal, but the draft for the products of combustion should be light.

For the support for the crucible in furnaces running ten hours per day I have found an old pot cut off at the right length and turned bottom up to be as good as anything tried.

The pieces to shut off at the top of the pot should be made of crucible stock and well seasoned.

During the convention other papers were read by David Guelbaum of Syracuse on "Theory of Direct Acting Steam Pumps and Its Results;" by W. H. Francis of Philadelphia on "A Modern Disinfecting Plant;" by W. A. Rogers of Waterville, Maine, on "Cumulative Errors of a Graduated Scale," and by Professor Carpenter on "Experimental Determination of the Effect of Water in Steam on the Economy of the Steam Engine."

The Worthington Condenser.

The drawing here presented represents a plant of ten blast furnace blowing engines at the Illinois Steel Company, South Chicago, provided with ten condensers built by Henry R. Worthington, New York. The valves of the steam end are each moved positively by the steam applied to the piston of the opposite cylinder and such obstructions as dirt, scale, rust or gummy cils, which sometimes prevent steam moved valves from operating, are powerless to prevent the regular and positive action of these plain slide valves. Neither is there any liability of leakage by reason of the wearing of the valve and its seat, as is often found in piston valves or steam moved valves.

It is unnecessary to say to those who are familiar with the management of blast furnaces that reliability in the blowing engine and its attachments is of the first consideration, and with a view of making them as simple as possible they are often used as non condensing engines, greatly to the loss of economy, but the invention of a separate and entirely independent apparatus for producing a vacuum by the condensation of the exhaust steam has made it possible to utilize the value of the vacuum on a blowing engine without any of the risks that pertain to attached air pumps on the main engine.

The spray pipe within the condenser cone is so arranged that it can readily be freed from any obstructions that might collect in it and interfere with the passage of the injection water, and this, too, without stopping the working of the apparatus.

The piston rods of the water end, in addition to having the usual packing, have a small pipe connecting the stuffing box with the delivery chamber of the pump, so that if at any time the

packing becomes worn the water within this pipe will be drawn into the stuffing box, thus sealing the same and preventing the admission of air, which otherwise would impair the vacuum, until the pump can be repacked.

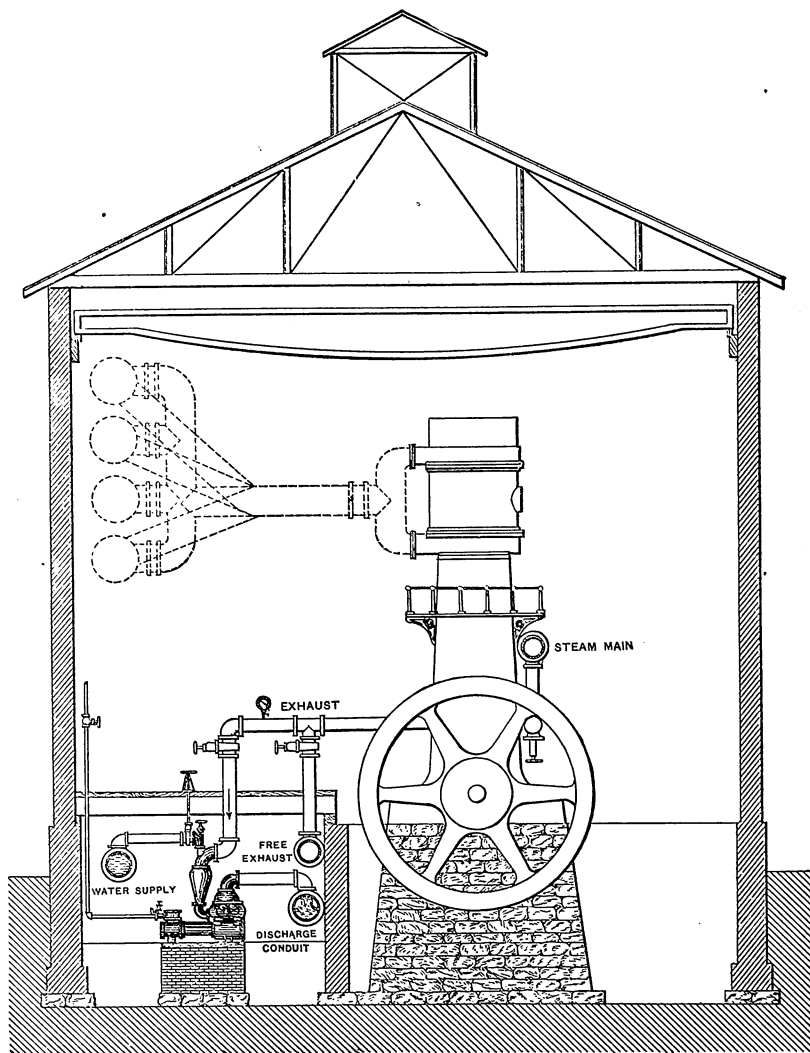
The cut is intended to show the method of piping a Worthington condenser to one or more vertical blowing engines. Each of these engines, when exhausting into its condenser, develops about 700 horse-power, making a total of 7000 horse-power in the plant.

As will be observed, the injection water is drawn to the condenser through a conduit located in the basement, and is discharged into a pipe that is in communication with the discharge pipes of

of the vacuum is most appreciated. It is found that during this period a blowing engine supplied with a Worthington condenser will maintain its speed with 15 to 20 pounds less steam pressure than is absolutely necessary when exhausting against the atmosphere without a condenser.

It should be remembered that Worthington condensers of any size can be constructed for this work.

As an instance of the application of the Worthington condenser to steel works engines it may be mentioned that a machine using 7000 gallons of injection water per minute, or something over 10,000,000 gallons per day, is now condensing the steam and maintaining



THE WORTHINGTON CONDENSER.

each of the ten condensers. A simple arrangement of valves and piping enables the engines to be run non-condensing if desired, the exhaust being in that case through a common exhaust pipe to the atmosphere. This, however, is merely a matter of precaution, and it is quite common practice where the water supply for injection is thoroughly assured to provide an exhaust into the condenser only.

The value of a vacuum is well known to steam engineers, and especially when used in connection with blowing engines, which, as a rule, are designed and proportioned to operate with a low steam pressure, in order to be able to maintain the speed and the consequent air pressure at the time when the furnace gases are depleted and the steam pressure is low. It is at such times that the value

a vacuum upon a pair of double reversing rail mill engines under the most trying conditions of stopping, starting and reversing under full load, and when carrying steam very nearly full stroke. The quantity of steam condensed is about equivalent to that which would be exhausted by a 4500 horse-power engine with a water rate of 25 pounds per horse-power per hour.

A press dispatch from Grand Junction, Col., states that on the 8th inst. an immense volume of natural gas was struck in the experimental well of the Western Colorado Development Company at a depth of 500 feet. The force was so strong as to blow out the pipes. The pressure is estimated at 200 pounds to the square inch.

THE WEEK.

The mule is to be superseded by electric propulsion on the Chesapeake and Ohio Canal as a consequence of the recent successful experiments with the trolley on the Erie Canal.

The Department of Immigration reports that during the last fiscal year there arrived at our ports 440,793 immigrants. Of these, 1063 were not permitted to land under the limitations of the law, and 577 were returned to countries from whence they came by reason of their having become public charges. The total arrivals were 141,034 less than the previous year.

The North German Lloyd Steamship Company have established a new line of steamers to ply between Baltimore and Bremen.

Florida's orange crop this season is estimated at 5,000,000 boxes.

November's coinage by the United States mints was the greatest executed in any one month for many years past. The number of pieces coined aggregated 7,523 602, of the value of \$11 031,-440.35. Of this amount the gold coined aggregated 1,265 400 pieces, of the value of \$10,784,800; the silver only 976,202 pieces, of the value of \$142,-340 35. Of the minor coin, 4,120,000 1-cent pieces were coined, to meet the demands of the Christmas trade.

With the object of acquiring an unobstructed outlet to the lakes, the Pennsylvania Railroad Company have secured a controlling influence in the Toledo, Peoria & Western Railroad. This will largely facilitate the business of the Pennsylvania Company in Northern Indiana and Illinois.

Extensive fortifications are being constructed by the British Government as a defense for the port of Esquimaux, B. C. Some heavy guns have been received from England for the new batteries within the last week or two.

While boring a well on the property of a Cold Storage Company in the city of Montreal, a few days ago, natural gas was struck at a depth of 1020 feet. This discovery, it is believed, may lead to important results.

The British Board of Trade returns for November show a reduction in foreign trade from that of October. The imports for November amounted to \$171 844,109, and the exports to \$84,-736,043. A considerable decrease in the receipts of American wheat was one of the unfavorable features of the month. American cotton showed, however, a slight increase over October.

Among the decisions handed down by the Missouri Court of Appeals at St. Louis recently was one declaring that a debt contracted in an option deal cannot be collected by law, as such speculation is gambling and illegal.

The town of Danbury, Conn., has appropriated \$50,000 to provide employment and otherwise relieve the destitute of that community.

The Ordnance Department opened on Tuesday the bids for a preliminary supply of smokeless powder suitable for the new Krag Jorgensen magazine rifle, now being manufactured for the army at the Springfield arsenal.

Richard Raddatz of Oshkosh, Wis., is reported to have succeeded, after ten years' study and experiment, in producing a submarine boat which can operate

at great depth and be run by one man. The boat has been engaged by a Detroit wrecking firm to make a survey of western Lake Huron next spring.

Philadelphia is to dispose of her garbage by cremation. A proposed ordinance provides for the construction of a number of furnaces at \$40,000 each.

The coal shipments on the Reading road for the month of November exceeded those of any previous month in the history of the company by 9000 cars.

President Gompers of the American Federation of Labor places the present number of unemployed workmen in the United States at 3,000,000. Mr. Gompers, in his annual address in Chicago on Monday last, attributes the dearth of employment to the extraordinary industrial depression of the past few months, superinduced by overproduction and the general adoption of labor saving machinery. The only method, he believes, by which a practical, just and safe equilibrium can be preserved in the industrial world for the fast and ever increasing introduction of machinery is a commensurate reduction of the hours of labor. He expressed himself as very sure that if employers were to substitute a division of the work required among all their workers instead of the discharge of a number, the country would much sooner emerge from its present industrial and commercial stagnation. This is a part of the truth, doubtless, if not the whole of it.

Statistics obtained by the New York Press from the various labor associations give the following figures as presenting a conservative estimate of the present number of unemployed work people in the five large cities named: New York, 115,000 to 140,000; Chicago, 124 000; Philadelphia, 90,000; Boston, 39,000, and Cincinnati, 25,000. Relief associations throughout the country, whether of a permanent or temporary nature, are doing their utmost to mitigate the prevailing distress, but their resources are already overtaxed, while the number of candidates for relief is constantly on the increase owing to the continued lack of employment and the advent of winter weather.

Pittsburgh's city officials, in conference last week, decided to raise \$100,000 by popular subscription, in order to aid the unemployed and deserving poor, the money to be expended in work on city improvements.

It is reported that several mills of Pittsburgh and vicinity are only paying \$4 per ton for puddling. This, it is stated, is causing great dissatisfaction among the operators of mills paying the Amalgamated price, \$4.75 per ton.

Trade Publications.

ONE OF THE MOST COMPLETE CATALOGUES of railway and machinists' tools and supplies ever issued is that just published by Manning, Maxwell & Moore of 111 and 113 Liberty street, New York. It contains 1103 imperial quarto pages of paper of fine quality; the 6000 engravings with which the book is embellished and the press work are of a very high grade; the binding is in keeping with a work so complete and expensive. In a notice of this description it is impossible to convey an adequate idea of the field covered, since the index, which merely names the several machines and appliances, occupies 12½ pages. The catalogue describes and illustrates stand and types of every kind of machine tools, and many forms of special de-

signs intended for some particular service, and also mentions the wide range of attachments and appliances necessarily belonging to such tools. No inconsiderable space is devoted to steam engines, pumps, boilers, pipe and fittings and machinery belonging with the same. In addition a wide range of small tools are mentioned. The catalogue, in short, meets the requirements of manufacturers using large or small tools or machines of every description.

Pumping Engines for New York.

Some time since the Department of Public Works of New York asked for proposals for furnishing material, building and erecting pumping engines, boilers and appurtenances for the high service works at the new aqueduct, between Tenth avenue and the Harlem River. It was thought by some of the bidders that the specifications were too rigid and that more option should be given them in the matter of certain details. When the bids were opened it was found that the difference between the highest and the lowest was so great that the Commissioners decided to reject them all and to draw up new specifications, somewhat more elastic in nature, and readvertise for new bids. The second bids have just been made public, and are as follows:

	Two 10,000,000- gallon capacity.	Two 4,000,000- gallon capacity.	Totals.
Henry R. Worthington.	\$30,250	\$28,225	\$116,950
Snow Steam Pump Works.	32,000	29,500	123,000
Groshon High Duty Pumping Engine Company	31,250	26,000	114,500
E. P. Allis Company.	37,000	35,000	144,000
Geo. F. Blake Mfg. Company.	27,500	27,500	110,000
Holly Mfg. Company.	36,800	34,850	143,300

The contract has therefore been awarded to the Geo. F. Blake Mfg. Company of New York and East Cambridge, Mass., at their bid of \$110 000.

The contract calls for two vertical triple expansion 10,000,000-gallon engines, boilers and appurtenances complete, and two vertical triple expansion 4,000,000 gallon pumping engines, boilers and appurtenances complete, making a total capacity of 28,000,000 gallons per day. The engines will have automatic cut off and will be operated with 160 pounds of steam. The makers say that they will embody the most modern ideas of engineering, and that in constructing them many of the old time customs will be abandoned, and that the plant, as a whole, will be one of the finest that has ever been built in this country.

The specifications provide that the plant when completed must be capable of obtaining a duty of 90,000,000 foot-pounds of work for each 100 pounds of first class coal consumed by the boilers.

When completed each reservoir pumping engine will be run continuously for 24 hours to ascertain whether it does the maximum work required of raising each 24 hours 10,000,000 gallons of water into the stand pipe 100 feet above the level of delivery in supply tank, and shall be run continuously for 24 hours to ascertain whether it does the minimum work required of raising each 24 hours 5,000,000 gallons of water into the stand pipe 100 feet above the level of delivery in supply tank.

In the case of the engines of smaller capacity, they will be required to undergo a similar test, except that the amount of water raised will be 4,000,000 gallons, and the height of the tower 230 feet. The work must be completed within 300 days.

The Iron Age

New York, Thursday, December 14, 1893.

DAVID WILLIAMS, - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, - - EDITOR.
GEO. W. COPE, - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - HARDWARE EDITOR.
JOHN S. KING, - - BUSINESS MANAGER.

Plucking up Courage.

The West was hit particularly hard during the financial flurry of last summer. Bank failures were more numerous by far than in the East or South. Business was therefore depressed more than in other sections of the country. Chicago, it is true, was abundantly supplied with currency on account of the World's Fair, which drew supplies from all sections, and St. Louis was almost phenomenally free from financial disturbances, but both cities suffered greatly through the prostration of general business in contiguous territory. Recovery has been very slow from this condition, but there are indications now of growing confidence in the minor industries, which form a very important part of the business fabric. Establishments which have been closed for lack of work and others that have stood idle since the bankruptcy of their owners are now getting into operation again. Their wheels may move slowly for a time, and but few workmen may be employed instead of the usual force, but that is to be expected. A great point is gained when the way opens for an actual start. A prostrate man gets on his knees before he rises. The fact that he can get on his knees, however, shows that he is trying to get up. It is just so with the manufacturers to whom we allude. Their efforts to run on part time or with partial force show that they have not lost all their business courage, and once having made a start they will not only acquire more confidence themselves, but will instill some into their neighbors.

While great operations will be checked until the uncertainties of tariff legislation are cleared up, there is, nevertheless, continual consumption or waste, which must be renewed. The country cannot come to a complete standstill with all the consumption stopped. The heavy curtailment of productive industries during the past summer and autumn cut down the stocks of manufactured goods in many lines to a point requiring almost an uninterrupted flow of those goods from loom or workshop through the hands of distributors to the consumer. Such a movement as this cannot be stopped unless the purchasing power of the people is absolutely cut off or factories get to running more generally and accumulate stocks in excess of the wants of the people. Neither of these contingencies is imminent. On the contrary, there is a decided probability that consumption will continue to in-

crease, keeping pace with the gradual increase in output. This statement may be criticised by those who only draw comparisons between their present volume of business and that of the corresponding time last year, but it will be approved if comparisons are made on the basis of conditions ruling last summer and during the early weeks of autumn.

There is a disposition among Western business men to take quite a hopeful view of the situation, except perhaps those who are directly interested in iron ore mining. The rapid accumulation of money at the financial centers, surpassing anything previously known in the history of the country, is looked upon as affording a strong argument in favor of an early improvement in general business. The savings banks of Chicago, by concerted action, have reduced the rate of interest on deposits from 4 to 3 per cent. per annum, with the avowed object of discouraging further deposits and to force surplus money into business channels in which it will do more good than in the savings banks. At the same time important local projects are coming forward for the investment of capital, the promoters being inspired by the belief that this is a good time to launch them when money is abundant, the rate of interest is low, materials of all kinds are cheaper than ever before known, and labor is anxious to be employed. They argue that the time to make great improvements is when business is depressed and every advantage is on the side of the capitalist, instead of waiting until times improve and labor and material are in active demand.

The impression is also gaining ground that the new Tariff bill will be passed in the form in which it has been reported, but that modifications will be made in its most radical provisions. Whether this impression is well founded or is merely born of a spirit of excessive hopefulness, it is having an effect on quite a considerable class of manufacturers and business men, who are, therefore, eliminating the tariff question from their consideration of influences governing the course of trade within a reasonable period in the future. If they have accurately diagnosed the tariff situation, and the bill is amended as it progresses so that great interests are not seriously disturbed, there is no other obstacle barring the way to a rapid recovery of the ground lost by Western business interests in 1893.

One feature of the McKinley tariff and the measures preceding it is conspicuous by its absence in the proposed measure now before the country. We refer to that clause which classifies separately bars and billets made with the aid of charcoal as a fuel and imposes upon them a duty of \$22 per ton. There is a good deal of variation in the price of Swedish material of this class, but we understand that £6. 10/, at works, is the selling price now for good

grades. This would make the duty \$9.50 against \$22, or a cut of more than one-half. While it would not influence the common grades of American soft steel and puddled iron, it would have a very great effect upon the higher qualities of American material, the market for which would be practically delivered over to the Swedish producers.

The Tin Plate Trade.

Some advantages derived from the establishment of a tin plate industry in this country have been strikingly manifested during the business depression of this year. Jobbing houses have been enabled to curtail their stocks of tin plates just as they have curtailed their stocks of other goods. Instead of purchasing large quantities, as they would have been obliged to do if importing, and thus having a considerable amount of capital steadily tied up, they have drawn on the manufacturers for just what was needed for an assortment from time to time. American manufacturers of tin plates have thus had to carry stocks for their customers in the same way that other manufacturers have been obliged to do in every time of depression or falling markets. It is an advantage so much appreciated that frequent reference is made to it by jobbers who are solicited to buy foreign tin plates. Within a few days a very large order has been secured by a Western tin plate works from a jobber, with the understanding that shipments are to be made in such quantities as are needed to supply his trade, with payments made accordingly. There is little question that the general depression in business has operated greatly to the advantage of American tin plate makers in this way, and that their trade has grown much faster among jobbers than would have been the case in the same period if money had been easy and the times prosperous. Manufacturers of tinware have pursued the same policy as the jobbers, but perhaps not to the same extent, as they could not run the risk of finding themselves suddenly out of stock.

Lest it be claimed that the figures are excessive which have been chosen by American manufacturers to illustrate the magnitude of the cuts proposed by the Wilson bill, under the guise of ad valorem rates of duty, we place before our readers some data above all caviling. Every two months the arbitrator of the North of England iron trade goes over the books of the works associated with the sliding scale and announces the average prices at which product has sold. This forms the basis of the award for wages for the succeeding period of two months. Mr. Waterhouse has just reported these figures. Thus there have been sales of 8390 tons of iron plate on which the average net price was £4. 11/5.94. This figures out 0.988

cent, so that the duty would be 0.296 cent, as compared with the present rate of 0.65 cent per pound. In other words, the duty has been cut more than one-half. American plates have not sold as low as 1.50 cent, tidewater, even during the present panic period. Should prices rise even one-tenth, then foreign material would come in, since price plus duty figures out 1.284 cents, which would leave nearly \$5 per ton to cover costs and freight. On bars the arbitrator reports sales of 11,683 tons at an average price of £5. 2/2.72, which figures 1.10 cents per pound and makes the duty 0.33 cent. We do not know whether Mr. Waterhouse arrives at his average by taking in the prices realized on extra sizes. If he does, then there is danger in this direction when our recovery comes. On angles the average selling price of 3839 tons was £4. 13/4.60, which is equivalent to 1.01 cents per pound and makes the Wilson duty 0.30 cent, as compared with 0.9 cent now, a reduction to one-third. With angles down to their lowest notch of 1.55 cents, tidewater, now, English competition under the Wilson tariff would be very uncomfortably close.

The "World" and the Iron Trade.

The New York *World* has seen fit in its issue of December 12 to question the accuracy of a series of figures presented by *The Iron Age* in a review of the Wilson bill. We care nothing for the reputation of our contemporary as an authority in the iron trade, nor have we any interest in vindicating our own before its clientele. We want the public to know the facts, and shall simply exercise the privilege of reviewing our reviewer, analyzing the *World's* statements, paragraph by paragraph. We quote:

The Iron Age deals first with the proposed cut in the duty on pig iron from \$6.72 a ton to 22½ per cent. It asserts that certain brands of Cumberland Bessemer pig (foreign) have sold as low as \$10.25 put on board ship. Another foreign brand, Collins Scotch foundry, has sold down to \$12.50. Another very cheap foreign pig has been down to \$7.07. Alabama pig has been down to \$7.50 at the furnace. Adding \$2 for freight to the seaboard and \$2 more for water freight to New York, Alabama pig at this price would be brought to New York at \$11.50 a ton. In reality the freight charge to New York is \$1.50, but we will let that misrepresentation pass.

The freight on pig iron from Birmingham, Ala., to New York, is \$4.01. We have stated the truth. The *World* is wrong.

Taking the Cumberland Bessemer for comparison, *The Iron Age* compares high-priced English with low-priced American pig. We find that the foreign pig would pay a duty of \$2.31. The freight would be, say, 75 cents. Therefore, the Cumberland pig would be landed in New York for \$13.31. On *The Iron Age's* own showing, therefore, the Alabama pig makers would have a margin for profit of \$1.81 a ton, or nearly 16 per cent.

The trouble with this part of the criticism of the *World* is that there is not a pound of Bessemer pig made in Ala-

bama nor elsewhere in the South, except by the one small furnace, the Cranberry, which makes about 100 tons per week and is not in blast now. Prices on the mill and foundry grades produced in the South have nothing to do with values on domestic or foreign Bessemer pig. If our contemporary wants to make a comparison let it turn to Pittsburgh, where Bessemer pig is selling cheapest in the country, say \$11, and add \$2.80 for freight, or \$13.80, delivered, New York, as compared with \$13.31 for Cumberland.

The cut in the rate on steel rails is the next subject of complaint. *The Iron Age* asserts that English rails may be bought at the works for \$17.50. The proposed new tariff rate is 25 per cent., which would make the duty \$4.37 instead of \$13.44, the tax under the present law. According to *The Iron Age's* own figures the freight charge and insurance would be \$2.25 a ton. Therefore a ton of English rails landed in New York would cost, duty paid at the Wilson bill rates, \$24.12. As the American rail makers are willing to sell their product at \$24, it follows that the Wilson bill furnishes them ample protection. Moreover, it is not true that English rails can be bought as low as \$17.50. The price is about \$18, which would make the rails landed in New York, paying the Wilson rate of duty, worth \$24.70. The Carnegie works turn out rails at about \$15.50 the ton, and the freight from Pittsburgh to New York is \$2.80, so that the rail stands the manufacturer in \$18.30, leaving him a profit of at least \$6 a ton, or nearly 40 per cent., if he undersells the English rail by 40 cents on the ton. But if he would enjoy this profit he must then make a rail as good as the English. This might be a hardship to him, but it would be a blessing to the railroads and to shippers.

Recent sales at Montreal of English steel rails have been made at a shade over \$20, delivered, which is on the basis of \$17.50, English works. We assert again that steel rails can be bought in the English market at £3. 10/. We confess that Mr. Carnegie has not told us recently what his rails cost him.

The Iron Age's statement as to beams is very inaccurate. The *World* has undertaken to inquire for itself as to the facts concerning these articles. Instead of \$18.75 steel beams cost on board at Antwerp about \$26.25. The proposed duty and the freight, which is \$2.50 instead of \$1.50 as stated by *The Iron Age*, would make the German beams cost very nearly \$39 a ton. As our own makers, according to *The Iron Age's* New York market quotations, are selling beams 15 feet long at from \$33 to \$35 a ton, it is impossible to see how the reduction can injure them.

We know that steel beams have sold at the price we named, to capture business. We stated distinctly that it was at interior German mill. This is the figure upon which the calculation must be made, because the duty is assessed on the price at mill and not on the f.o.b Antwerp price. We may add that our figuring was checked by the representative of one of the largest and oldest New York importing houses.

We leave the evidence as it stands to the judgment of the iron trade, American and foreign, and need not even point in support of our own cause to the manifest ignorance of our critic.

CORRESPONDENCE.

The New York Air Brake Company.

To the Editor: On page 1038, issue of December 7 of *The Iron Age*, under the heading of "Machinery," we notice an article referring to the recent decision in the United States Court in regard to the suit between Westinghouse and the New York Air Brake Company. The concluding paragraph of this notice is so at variance with the facts that we feel justified in asking that in your next issue the actual facts be stated. The paragraph we refer to reads:

"The officials of the New York Air Brake Company say they will take an appeal, and if they succeed in reversing the judgment their works at Watertown, N. Y., which have been closed by the injunction, may be started up again."

Such information was certainly not obtained from the officers of the New York Air Brake Company. Our works are not closed by the injunction, and will continue to run as heretofore. The decision is on two minor parts of our apparatus, one of which was discarded two years ago, not now in use, and the other is on a very small part of the triple valve. Even if the decision is sustained in the Court of Appeals there is nothing whatever to prevent the continued manufacture and sale of every portion of our present brake and signal apparatus, excepting a certain form of triple valve, and if the decision is reversed in our favor we can, of course, continue to furnish that form. In the meantime, as only a slight modification is required to make the triple valve free, we, of course, have only to make that slight alteration, and continue to furnish that also.

Trusting that these matters will have your attention, we remain,

Yours very truly,

THE NEW YORK AIR BRAKE COMPANY,
Per C. E. LEACH.
NEW YORK, December 9, 1893.

Washington News.

(From our Special Correspondent.)

WASHINGTON, D. C., December 12, 1893.

The full Committee on Ways and Means are having two sessions a day in hopes of completing the Tariff Revision bill for report to the House before the close of the present week. Representatives Harter of Ohio and Wheeler of Alabama have been quite industriously circulating a petition asking a caucus of the majority on the tariff bill. There is a growing feeling of opposition to the measure among the majority Representatives of industrial districts, irrespective of localities. But the indisposition to put this opposition into practical operation is shown in the inability of Messrs. Harter and Wheeler to obtain up to this time the requisite 20 names to compel the issue of such a call. It is admitted that if a caucus is held on the bill it will not be likely to get into the House for some time.

There have been some individual conferences with the chairman in hopes of securing an increase of rates for certain articles, but with the exception of certain items in the cotton, wool, silk, button, lumber and china provisions the customs part of the bill has thus far been allowed to stand.

In the metal schedule tin plate has been changed from 40 per cent. ad

valorem to $1\frac{1}{2}$ cents a pound, to take effect October 1. Lead and lead products, one-half the present specific rates, instead of ad valorem. Lead sheets, $1\frac{1}{2}$ cents a pound, instead of 1 cent per pound. Black plate, $\frac{1}{10}$ cent a pound, instead of 35 per cent. ad valorem. Wire, from 30 to 35 per cent. ad valorem. Ferromanganese, 10 per cent., instead of $22\frac{1}{2}$ per cent. ad valorem. Pocket knives and razors are also put at a uniform rate of 45 per cent. The great industries which have been reduced to such a ruinous scale of rates are to be forced to submit, notwithstanding a number of representative men or Representatives themselves in the House have striven to secure more favorable rates. Mr. Schmidt of York, Pa., one of the largest chain manufacturers in the country, had a conference with Chairman Wilson to-day and tried to show him that the rate fixed by the committee bill would be ruinous to that industry generally, but particularly on the smaller sizes. He urged the substitution of a graduated scale as in the existing law, and pointed out the operations of the present law in order to illustrate his meaning. The chairman gave him the stereotyped answer that if they begin to make changes there will be no end.

Representative Beltzhoover, one of the majority members of the House and who represents that district, went before the chairman himself and informed him that one-half the chains manufactured in the United States were made in his district and asked reconsideration of the rates on chains, but received no satisfaction.

Mr. Beltzhoover says that he has ascertained that the committee fixed those duties at the new rate without hearing anything on the subject from any source, without desiring to hear any, or without knowledge as to where chains were made and how many.

It is now two weeks since the bill was made public and the committee are still floundering about trying to devise means of making up from internal taxes what they cut down on customs. The loss of revenue from this source is put down at from \$50,000,000 to \$70,000,000. There is also a deficiency of \$50,000,000. The damage to the revenue is from the free list. The lower customs will flood the country with foreign manufactures and produce revenue, but it will not do much for American industries and wage workers. The postponement of the time of the bill going into effect to June 1 has greatly demoralized those of the majority, who have had considerable correspondence with their constituents on the subject and were disposed to help them, except to vote for the bill, when it comes in the House, they doing all in their power to raise the rates in the committee of the whole where there is no tell tale recorded votes. Efforts are being made to effect a combination among the Representatives of the worst injured districts to mend the bill in Committee of the Whole. They will all vote for it in whatever shape it comes up for final action.

Later.—Secretary Carlisle, getting impatient over the delay in the completion of the tariff and revenue bill, visited the Capitol late this afternoon, and was some time in conference with the Ways and Means Committee. He has been holding his annual report to Congress, which should have been submitted at the opening of the session, in order to know what the committee intend to do in reference to making up from internal taxation what they take off on articles

placed upon the free list. He is unable to complete his report by making certain recommendations until he can obtain that information.

The committee clerks are working on the changes in the bill which have already been announced, for the purpose of getting out a revised print. Things are in a great muddle and growing worse.

It was also developed to-day that the opposition to the bill is gaining ground. The petition which has been in circulation asking a caucus of the majority has, General Wheeler said this afternoon, over 50 names. Under the rule 20 are enough signatures to secure the call. If the names on the petition represent the strength of the majority determined to revise and amend the committee work it begins to look as if some of the worst features of the measure may be eliminated.

The friends of the Administration and the committee who represent either the free trade or the revenue element of the majority are antagonizing the caucus and will prevent one being called if they can.

Chairman Wilson said this afternoon that he still hoped to get the bill before the House this week, but if it would have to be submitted to a caucus he could see no prospect of it getting into the House before the Christmas recess, which will begin in about ten days.

The committee are having frequent surprises from industrial sources in showing up the incongruities of the ad valorem system which they have adopted and in many cases would be glad to get out of the dilemma if they could do so without a collapse of their whole scheme.

The ad valorem system was entered into by them by a sort of sneak process, from which they are now reaping a harvest of criticism and condemnation from all parts of the country. They adopted the ad valorem system by a simple clerical process of figures without knowing the market prices of the articles.

They kept their industrial coup very quiet in order to avoid a storm in advance, by giving out specific rates. The process by which they made out their ad valorem rates was simply on the percentage of reduction on the specific duties in the present law, without reference to where or how the result struck. Without mincing matters, the tariff revision bill turned out thus far by the majority of the Committee on Ways and Means is one of the most disreputable measures of the kind ever proposed for legislative action. There are some Representatives who are hinting at the probability of its defeat, but this is not likely, as it would require upward of 50 votes out of the majority to accomplish that result and that seems at present out of the range of reason.

Figuring made this week by a leading importing firm on foreign ore shows that with a rate of freight of 8 shillings, which is unusually low, Bessemer ore carrying 58 per cent. would cost to lay down 7.3 cents per unit. If the duty of 75 cents were taken off this would make the cost 6 cents per unit, or \$3.48 per ton.

Joseph Wharton, founder of the Wharton School of Finance and Economy in the University of Pennsylvania, has recently given \$75,000 to that school, supplementing a previous sum of \$125,000 with which he originally endowed it.

Pig Iron Production Increases.

There has been quite a sharp increase in the current production of pig iron, and further additions to capacity are being made during the current month. Practically the additions to active capacity are confined to those plants which are connected with the rolling mills and steel works of the Central West, the adjustment of the wages question contributing thereto quite largely. In other sections, notably in the Chicago district, the resumption of some of the steel works must be telling on the stocks of raw material, thus bringing the interests in question nearer to starting their furnaces. On foundry grades the South shows some increase in production, to which further additions have been announced. This, however, is counterbalanced partly by stoppages in the Lehigh and Schuylkill valleys.

On December 1 the active furnace plant, grouped according to fuel used, possessed the following weekly capacity:

Fuel.		
Anthracite.....	32	16,188
Coke.....	72	78,241
Charcoal.....	26	4,950
Total, December 1.....	130	99,379
Total November 1.....	117	80,070
Increase.....	+13	+19,309

The weekly product of all the furnaces on December 1 compared as follows with that of preceding periods:

	Furnaces in blast.	Capacity per week. Gross tons.
December 1, 1893.....	130	99,379
November 1.....	117	80,070
October 1.....	114	73,895
September 1.....	125	83,434
August 1.....	169	107,042
July 1.....	220	153,742
June 1.....	244	174,020
May 1.....	251	181,551
April 1.....	255	178,858
March 1.....	255	176,378
February 1.....	251	171,201
January 1.....	246	173,068
December 1, 1892.....	246	176,271
November 1.....	244	171,082
October 1.....	236	158,027
September 1.....	236	151,648
August 1.....	238	155,136
July 1.....	254	169,151
June 1.....	239	173,674
May 1.....	268	177,886
April 1.....	280	185,462
March 1.....	305	193,902
February 1.....	308	187,383
January 1.....	305	188,082
December 1, 1891.....	298	188,135

The status of the anthracite furnaces was as follows:

Anthracite Furnaces, December 1.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New York.....	18	2	1,150	16	5,519
New Jersey.....	11	3	1,656	8	3,150
Spiegel.....	3	2	142	1	118
Pennsylvania:					
Lehigh Valley...	44	9	2,807	35	13,592
Spiegel.....	1	0	0	1	61
Schuylkill Valley.	27	7	4,280	20	8,935
U. S. Susquehanna Valley.....	14	2	942	12	4,275
L. Susquehanna Valley.....	17	3	3,275	13	4,040
Lebanon Valley..	15	3	1,946	12	5,470
Totals.....	150	32	16,188	118	44,829

For a number of months past our records of active anthracite furnaces show the following:

	Furnaces in blast.	Capacity per week.
December 1, 1893.....	32	16,188
November 1.....	34	16,166
October 1.....	34	15,338
September 1.....	43	20,758
August 1.....	51	23,572
July 1.....	63	29,298
June 1.....	70	33,916
May 1.....	67	33,168
April 1.....	72	34,641
March 1.....	74	34,773
February 1.....	74	32,871
January 1.....	70	32,772
December 1, 1892.....	69	33,602
November 1.....	69	30,869
October 1.....	69	29,958
September 1.....	66	27,463
August 1.....	66	28,821
July 1.....	72	31,754
June 1.....	76	33,209
May 1.....	81	36,473
April 1.....	84	36,487
March 1.....	89	38,878
February 1.....	92	38,124
January 1.....	94	38,307
December 1, 1891.....	85	34,905

During November there were blown out Norristown and Temple in the Schuylkill Valley. One Crane and one Macungie in the Lehigh Valley were banked. The Pennsylvania Steel Company are running all four of their furnaces.

The status of the coke furnaces was as follows:

Coke Furnaces, December 1.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New York.....	7	1	1347	6	3,900
Pennsylvania:					
Pittsburgh district.....	25	17	30,906	8	11,649
Spiegel.....	1	1	1,000	0	0
Shenango Val.	16	5	4,447	11	9,508
Juniata and Conemaugh Valley.....	16	5	4,237	11	8,870
Spiegel.....	1	0	0	1	575
Youghiogheny Valley.....	3	0	0	3	2,215
Miscellaneous.....	4	0	0	4	2,500
Maryland.....	5	2	3,059	3	3,350
West Virginia.....	1	0	0	1	250
Wheeling District.....	8	3	3,886	5	4,369
Ohio:					
Mahoning Val.	14	4	4,810	10	7,337
Central and Northern.....	11	3	2,620	8	6,483
Hocking Val.	14	1	762	13	3,041
Hanging Rock.....	14	3	850	11	2,333
Indiana.....	2	0	0	2	412
Illinois.....	19	0	0	19	26,875
Minnesota.....	1	0	0	1	629
Wisconsin.....	5	0	0	5	4,010
Missouri.....	6	0	0	6	3,572
Colorado.....	3	0	0	3	1,800
The South:					
Virginia.....	22	9	5,393	13	6,850
Kentucky.....	7	0	0	7	3,243
Alabama.....	38	12	10,023	26	13,690
Tennessee.....	14	5	3,275	9	3,500
Georgia.....	2	1	626	1	600
N. Carolina.....	1	0	0	1	97
Totals.....	260	72	78,241	188	126,608

As compared with previous months, the active coke furnaces make the following showing:

	Furnaces in blast.	Capacity per week.
December 1, 1893.....	72	78,241
November 1.....	57	58,820
October 1.....	52	59,061
September 1.....	54	56,976
August 1.....	84	77,907
July 1.....	122	117,072
June 1.....	140	132,079
May 1.....	146	139,788
April 1.....	145	135,488
March 1.....	145	133,519
February 1.....	140	129,396
January 1.....	138	131,731
December 1, 1892.....	136	133,160
November 1.....	133	130,673
October 1.....	128	118,895
September 1.....	128	114,638
August 1.....	131	117,984
July 1.....	140	127,433
June 1.....	145	128,852
May 1.....	147	132,313
April 1.....	152	138,116
March 1.....	163	143,490

February 1.....	167	138,268
January 1.....	163	138,611
December 1, 1891.....	162	142,747

Among the large number of coke furnaces which have resumed is Niagara in New York, the second Monongahela, at Pittsburgh, Rosena and Stewart in the Sheango Valley, two Cambria, at Johnstown, Riverside and Bellaire in the Wheeling district, Franklin and Emma in Central Ohio, and Haselton in the Mahoning Valley. Since the beginning of the month others have started and an additional number are preparing for early resumption.

In the South Allegheny has started in Virginia, and Dayton and No. 2 South Pittsburg in Tennessee are again in blast.

The status of the charcoal furnaces was as follows:

Charcoal Furnaces, December 1.

Location of furnaces.	Total number of stacks.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New England.....	13	5	390	8	570
New York.....	5	1	90	4	475
Pennsylvania.....	13	2	156	11	761
Maryland.....	6	1	45	5	380
Virginia.....	13	0	0	13	827
Ohio.....	9	4	287	5	263
Kentucky.....	3	1	97	2	200
Tennessee.....	8	1	301	7	690
Georgia.....	3	1	235	2	230
Alabama.....	13	2	43	11	2,740
Michigan.....	20	5	1,584	15	4,875
Missouri.....	2	1	314	1	293
Wisconsin.....	4	1	700	3	1,127
Texas.....	4	0	0	4	603
Washington.....	1	0	0	1	100
Oregon.....	1	1	225	0	0
Totals.....	118	26	4,950	92	14,154

As compared with previous months, the record of active charcoal furnaces stands as follows:

	Furnaces in blast.	Capacity per week.
December 1, 1893.....	26	4,950
November 1.....	26	5,084
October 1.....	28	5,496
September 1.....	28	5,700
August 1.....	34	5,563
July 1.....	35	7,224
June 1.....	34	8,034
May 1.....	38	8,595
April 1.....	38	8,729
March 1.....	36	8,623
February 1.....	37	8,934
January 1.....	38	8,865
December 1, 1892.....	41	9,509
November 1.....	42	9,540
October 1.....	39	9,174
September 1.....	42	9,657
August 1.....	41	9,331
July 1.....	42	9,964
June 1.....	48	11,613
May 1.....	40	10,100
April 1.....	44	10,859
March 1.....	50	11,734
February 1.....	49	10,991
January 1.....	48	11,164
December 1, 1891.....	52	11,033

Very few important changes have taken place with the charcoal furnaces.

Stocks.

The position of stocks, sold and unsold, as reported to us December 1, was as follows, the same furnaces being represented as in former months:

	Sept. 1.	Oct. 1.	Nov. 1.	Dec. 1.
	Tons.	Tons.	Tons.	Tons.
Anthracite pig.....	115,980	121,597	134,137	134,476
Coke pig.....	513,260	532,157	503,806	485,292
Charcoal pig.....	197,881	199,008	200,450	199,220
Totals.....	827,071	852,762	838,413	818,987

During November the stock of coke pig iron was reduced by 18,514 tons, as compared with a decrease of 28,351 tons during October. Charcoal stocks have increased 1230 tons and anthracite stocks 318 tons, as compared with an increase of 1442 tons and 12,560 tons respectively during October.

MANUFACTURING.

Iron and Steel.

In the courts at Pittsburgh last week a bill was filed asking for the appointment of a receiver for the firm of Wm. Clark's Son & Co., proprietors of the Solar Iron & Steel Works in that city. The bill was filed by the attorneys for Elizabeth D. Clark, administratrix of the late Edward L. Clark, against Jane Clark. This litigation, in which a very large sum is involved, is based on the following statement as set forth in the application for the receivership: Edward L. Clark died April 25, 1893. In April, 1888, he and Jane Clark, the defendant, entered into partnership as the firm of William Clark's Son & Co., with a capital of \$380,000, of which she possessed \$224,000 and he \$156,000. By an agreement she was relieved from any liability for losses of the firm, and in consideration of a guarantee of a profit of 10 per cent. per annum on her capital, or \$22,400 per year, for five years, he was to operate the business, bear all the losses and receive all the profits. He conducted the business under this agreement until April 22, 1893, and paid the defendant the \$22,400 per year agreed upon. At the time of his death he had accumulated net profits exceeding \$268,000, of which he had on deposit in the bank \$100,000 in the firm name of William Clark's Son & Co. The balance was in bills receivable, book accounts and other assets of the business. There were no debts owing. Since his death the defendant has assumed the right to manage the business as the surviving partner, and has appropriated to herself the entire assets, including the profits belonging to the deceased, and through agents is conducting the business for her own account and benefit, without the plaintiff's consent. The plaintiff asks for the dissolution of the partnership and that a receiver be appointed to take charge of the business and pay the balance due the estate of Edward L. Clark, also that the defendant be restrained from disposing of any of the effects of the partnership or interfering in any way in the business and especially with the accumulated profits belonging to Edward L. Clark. An accounting is also asked for.

The large plant of the Aetna-Standard Iron & Steel Company, at Bridgeport, Ohio, has not been in operation to full capacity at any time since last July. Last week at this plant there were ten sheet mills, two guide and one bar mill in operation, but how long these departments will continue running depends altogether on the receipt of orders. For some time this firm have made it a practice to operate such parts of their works as they have orders for, and on the completion of specifications in hand close down their mills for further accumulation.

During the last three days of week before last the mills of the Brown-Bonell Iron Company, Youngstown, Ohio, were on full time, except one puddle mill. On Monday, December 4, the entire plant was idle for inspection of boilers. On the following day eight finishing mills and three of the puddle mills were put in operation, but it is uncertain just how long these departments will continue running.

Mabel Furnace of Perkins & Co., Limited, Sharpsville, Pa., will probably go in blast about January 1 next. During the idleness of this furnace some repairs to equipment have been made which will increase the output to some extent. Spearman Furnace of the Spearman Iron Company, at Sharpsville, Pa., is again in operation, after an idleness of some months. Alice Furnace, at Sharpsville, Pa., operated by the Wheeler Iron Company of Sharon, Pa., has again resumed blast. Douglas Furnace, at Sharpsville, Pa., formerly operated by Pierce, Kelly & Co., has recently been closed down permanently. It is not probable that any additional idle stacks in the Shenango Valley, with the exception of those noted above, will be put in operation in the near future.

The steel plant of the Laughlin & Junction Steel Company, at Mingo Junction, Ohio was in full operation last week. For the past three or four months this plant has been operated to about half capacity, owing to the scarcity of orders.

Zanesville Furnace of the Ohio Iron Company, Zanesville, Ohio, was put in operation on Tuesday, the 11th inst. This furnace is 15½ x 75 feet in size and has an annual capacity of about 40,000 net tons.

The charter of the Diamond Steel Company, recently organized at Reading, Pa.,

with a capital of \$50,000, was recorded in that city last week. Walter Steel, Edwin Sassaman, F. W. Hawman, Stanley S. Davis and Evan L. Shomo are the directors, and Samuel Y. Riegner the treasurer.

The Inland Steel Company of Chicago have completed their organization. J. E. Porter of Ottawa, Ill., is president, G. H. Jones, long connected with S. D. Kimbark, is vice-president and general manager, W. M. Adams is secretary and P. D. Block is treasurer. The office for the present is in Room 559 The Rookery. The company's plant at Chicago Heights was undertaken by the Chicago Steel Company, who failed last summer, but is now being completed by the new owners. They will manufacture agricultural specialties as well as steel angles, tees, channels and bars, for which they have a capacity of about 25,000 tons per annum.

The Fowler Foundry Company, Monadnock Block, Chicago, will shortly engage in the manufacture of steel castings, using for that purpose the steel plant at Stony Island avenue and Ninety-fifth street, Chicago, which has been idle for some two years. They will make a high grade of castings from the alloys of iron, nickel, aluminum and other metals, for special use in refineries, mills, railroad, marine and electric work, for which they have peculiar facilities. Their specialty will be heavy pieces entering into the construction of dynamos. Special facilities are enjoyed at this plant for the manufacture of large castings. The president of the company is H. W. Fowler of the Fowler Rolling Mill Company, and Joseph Grave is secretary.

In the future the main office of the American Tube & Iron Company, with mills at Middletown, Pa., and Youngstown, Ohio, will be located at the first named place, the financial department and books having been removed from New York City. The change was made for the purpose of securing greater effectiveness and economy in the management of the business.

At the West Penn Steel Works of Jennings Brothers & Co., Limited, in Allegheny, Pa., the only department in operation is the bar mill and the length of time it will continue running is very uncertain.

The Cambria Iron Company, Johnstown, Pa., have called a special meeting of the stockholders to be held on January 16, 1894, to vote for or against increasing the capital stock of the company from \$5,000,000 to \$10,000,000; also for or against a proposed increase of the mortgage indebtedness to the amount of \$2,500,000. It is reported that the object is to place the company under the new Pennsylvania Constitution, and that, while authority will thus be obtained to get increased capital by either increasing the stock or bonds, there is no present intention of a change, the authority being sought for future needs, and the method being left to the stockholders to determine whether capital shall be obtained by issuing more shares of stock or through a mortgage loan.

The Duluth Mfg. Company, Duluth, Minn., signed the Amalgamated Association scale last week.

The Warren Boiler Works, at Warren, Ohio, are building a new stack for the Thomas Furnace Company, at Niles, Ohio, which will measure 112 feet high and 11 feet in diameter.

The plant of the J. Painter & Sons Company of Pittsburgh, manufacturers of cotton ties, has recently been remodeled and a number of additions made, which will considerably increase their output.

The plant of the Locust Point Iron & Steel Company, at Locust Point, Md., has been sold to Mrs. Anna A. Coates for \$25,000. The sale was made by virtue of decree of the Circuit Court of Baltimore. The property included the rolling mill and tin plate works, as well as considerable adjoining property.

The Alabama Rolling Mill Company, Birmingham, Ala., signed the Amalgamated Association scale on November 30, and the puddling department of their plant was started up on Monday the 4th inst. It is probable that the bar and guide mills will be started in a short time, if such has not already occurred.

During this week some good sized records in production of rails have been made at the Edgar Thomson Steel Works, Bessemer, Pa. It is probable this plant will continue in operation on rails until the holidays, at which time it is customary to close down for a week or two for annual repairs.

The Diamond Steel Company, recently organized at Reading, Pa., have elected the following officers: Penrose W. Hawman, president; Samuel Y. Riegner, secretary and treasurer, and Walter Steel, general manager. It is stated that the new concern have received quite a number of orders, sufficient to keep their plant in operation for some time.

It is stated that the Haselton Rolling Mills of the Andrews Brothers Company, at Haselton, Ohio, is the only establishment in the Mahoning Valley that is being operated to full capacity.

Work is not being pushed on the new plant of the Minneapolis Rolling Mills Company, at Columbia Heights, near Minneapolis. Operations are deferred until the times are more favorable for such enterprises. J. F. Conklin is president, O. C. Merriman vice-president and F. L. Langan secretary.

Denniston & Ryder of Janesville, Wis., are rebuilding their galvanizing works on a much larger scale.

People interested in charcoal iron will find something of interest in the remarkable record of the Hinkle Furnace, Ashland, Wis., for the past three years. That furnace blew in on December 28, 1890, and up to December 5 of this year had produced 106,000 tons on one hearth. By the end of the month it will have made over 110,000 tons, an average of 37,000 tons a year, or over 100 tons per day, taking account of the few days banked each year for slight repairs, &c. The product of Hinkle goes mainly to malleable foundries throughout the United States, and negotiations are on foot for exporting it to malleable works in England. The product is handled by Rogers, Brown & Co.

Following the general strike of last week the roughers and catchers at the Newport Rolling Mill Company, Newport, Ky., have scraped up cause for a strike among themselves. The strikers claim that the rollers under whom they work have reduced their wages 25 cents per day. The rollers claim this was necessary, as they themselves had been subjected to a cut of 10 per cent., and that a cut of 25 cents on their helpers only brought the wages down to the actual scale. The catchers and roughers finally accepted the cut and returned to work.

The Spicer Mfg. Company, New Philadelphia, Ohio, have recently placed in the plant of the New Philadelphia Iron & Steel Company a mechanical drag out, consisting of a train of rolls, 9 inches diameter, each roll being driven independently by a set of bevel gears. This drag out is in connection with the muck mill, by means of which the iron after being rolled to suitable sizes, and while it is still red hot, is conveyed by means of the roll train to the shear, is sheared to length and dropped on a carrier, conveying it through a cast iron tub 16 feet long, filled with water. After passing slowly through this tub it is delivered to a truck or car, sufficiently cooled to permit of its being handled. This device does away with six laborers formerly employed to do this work. The work was done under the supervision of T. D. Morgan, superintendent of the mill.

The sheet and puddling mills of the Cleveland Rolling Mill Company, Newburg, Ohio, which have been shut down since July 1, have started up. A reduction of 12 per cent. from the old scale went into effect.

It is announced that two of Cleveland's industries, the Lake Erie Iron Company, employing 600 men and the Britton Iron & Steel Company, employing 200 men, have shut down, without prospect of starting again in the near future.

Last week it was stated that the blast furnaces, steel works and every other industry in Bellaire, Ohio, were in operation.

The sale of the steel plant at West Superior, Wis., has again been postponed for one month, and is not set for January 2. It is stated that the reason for postponement was to give the Rockefeller syndicate an opportunity to investigate the workings of the Adams process of direct steel making, which will probably be introduced into the plant.

The property of the Birmingham Mining & Mfg. Company, at Birmingham, Ala., has been sold under a decree of the court for \$163,915. A. W. Smith, trustee for the Birmingham Trust & Savings Company, and others were the purchasers.

A special dispatch from Tonawanda, N. Y., gives a highly colored account of a slight accident which occurred at the blast

furnace plant of the Tonawanda Iron & Steel Company. As a matter of fact, the story of a "terrific explosion" emanated from the explosion of a tuyere at the cinder notch, throwing off a few sheets of corrugated iron from the roof over it and breaking a few panes of glass nearby. Aside from this no damage was done and nobody was hurt, and the furnace was running again as usual as soon as a new tuyere could be put in place and the dirt cleaned up.

The Greenfield Iron & Nails Works, Greenfield, Ind., will, it is stated, resume work in about a week.

The sheet mills of the Joliet Sheet Steel Rolling Mill Company, Joliet, Ill., remain idle. It is understood that it is the intention of the directors to lease the mill if suitable terms can be arranged.

The Glendale Rolling Mill of Jos. L. Bailey & Son, in Berks County, Pa., have resumed operations.

The Wheeler Furnace Company have decided to continue their Alice Furnace at Sharpsville, Pa., in operation. It was the intention to blow it out at an early date.

The Wabash Iron Company, Terre Haute, Ind., have decided to run their puddling mill on single turn with the object of aiding their employees to tide over the winter. The mill started on the 11th inst.

The announcement is officially made that the works of the Pennsylvania Steel Company will be closed from December 23 until February 1.

It is announced that the Dunbar Furnace, at Dunbar, Pa., will resume operations in a few days, after an idleness of two years.

The Burden Iron Company of Troy, N. Y., have made a reduction of 10 per cent. in the wages of their 1500 employees. This is said to be the first reduction in ten years at this plant.

The Troy Iron & Steel Company of Troy, N. Y., have started two furnaces on Breaker Island and the Bessemer plant.

The Akron Iron Company of Akron, Ohio, have gone into the hands of a receiver.

Rumors have been current for some time that one of the oldest and largest blast furnace companies in the Lehigh Valley is in trouble.

The Cumberland Nail & Iron Company, Bridgeton, N. J., have started up their pipe and rolling mills.

The E. & G. Brooke Iron Company, at Birdsboro, Pa., have, according to a press dispatch, closed down their rolling mill, nail factory and wire mill for an indefinite period.

The strike at the Norton Iron Company's works, at Ashland, Ky., has been declared off, the firm having acceded to the terms proposed by the men.

It is stated that the Valley Steel Company, capitalized at \$450,000, an entirely new company, will be incorporated in Missouri to purchase the plant and business of the Belleville Steel Company, who failed in May last with liabilities amounting to about \$750,000.

It is stated that the second Colebrook and one or both of the two Lebanon furnaces, now idle, will blow in during the next two weeks.

Machinery.

The large upright engine recently built by Wm. Tod & Co., Youngstown, Ohio, for the Brown, Bonnell Iron Company of that place, has been tested with satisfactory results. The engine will run the 10-inch department and is calculated to make 200 revolutions per minute.

The Fulton Truck & Foundry Company of Mansfield, Ohio, have been incorporated with a capital stock of \$50,000, to manufacture street railway trucks, railway frogs and switches, electric railway equipment and do a general foundry business.

The Lloyd Booth Company of Youngstown, Ohio, note quite an improvement in orders and also in inquiries for machinery. This firm have sufficient contracts on hand to warrant moderate activity in their foundry and machine shops for some time to come.

At the regular meeting of the stockholders of the J. B. Sheriff Mfg. Company of Pittsburgh, held in that city recently, N. C. Davison was elected president, W. Gunning, vice-president, and Henry Tranter, secretary and treasurer. J. B. Sheriff has sold his entire interest in the above firm.

B. W. Payne & Sons of Elmira, N. Y., have shipped a 15 horse-power boiler to India, for a steam yacht to be used by C. A. Nichols, a missionary.

The Inman machine shops at Amsterdam, N. Y., are preparing to resume work full force and will probably start on full time January 1.

James P. Warren, 51 and 53 North Jefferson street, Chicago, has just built one of the largest exhaust steam heads thus far made in that city. It is intended for the electric plant of the Calumet Gas and Electric Light Company; will be used on a 20-inch pipe, and is 88 inches at its greatest diameter by 106 inches high.

William A. Jones, 57 and 59 South Jefferson street, Chicago, has just added to his foundry equipment the seventh machine for molding pulleys. The new machine will turn out a 60-inch pulley. Mr. Jones' enterprise presents a decided contrast to the timidity shown by numerous other manufacturers who need additional facilities, but are waiting for better times.

The destruction by fire of the Rome, N. Y., Locomotive & Machine Company's plant, on December 4, was a great loss to that city. The works were formerly the New York Locomotive Works, but when the present company bid them in for \$150,000, subject to a like amount in mortgages, making the valuation of \$300,000, the name was changed to the Rome Locomotive & Machine Company. Sixty-five men were employed. In the shops were two engines being repaired and almost ready for shipment. These the men succeeded in saving by getting them out. A new boiler in the blacksmith shop, almost completed, was destroyed with the building, which was two stories high and 225 x 70 feet. The boiler shop was 225 x 70, and the machine shop 270 x 80 feet, and both were burned. Aside from numerous small sheds all that is left is the building containing the main offices, the molding room and the finishing department, all being valued at about \$50,000. The buildings were all of brick. The one saved contains all the private offices and patterns made since the construction of the works about 12 or 14 years ago. The company carried about \$200,000 insurance, which will not cover the loss within \$50,000. The principal business was to repair and rebuild locomotives and manufacture gas tanks used in railroad coaches. President Thomas H. Stryker of the company is favorable to the idea of rebuilding the works, and will lay the matter before the directors at an early date. The fire is supposed to have been incendiary.

The Vilter Mfg. Company of Milwaukee, who made an assignment in the latter part of August, have made a settlement with their creditors and will resume business as soon as the assignee is discharged by the court, which will probably be in the early part of next week. The settlement is made on the basis of 100 cents on the dollar, but the creditors have given an extension of time covering three years and the Board of Directors of the company has been strengthened by the taking in of several of the largest creditors. When the company suspended the liabilities were \$205,297.06 and the assets \$377,660.28.

Turner, Dickinson & Co. of Chicago have settled with their creditors and discharged their assignee. They are building a new foundry at the suburb of Cragin, on the St. Paul Railroad, to secure greater facilities, but will continue to finish the castings in their machine shop at Churchill street and Hoyne avenue.

The machine shops of the Baltimore & Ohio Railroad, at Garrett, Md., which have been almost entirely closed for about four months, have again resumed operations to nearly full capacity, giving employment to a large force of men.

The Bovaird & Seyfang Mfg. Company, extensive manufacturers of oil well supplies, with headquarters at Pittsburgh, have gone into the hands of receivers, the application being made at Bradford, Pa., last week. T. H. Kennedy and J. P. Cochran of Bradford, large stockholders, have been appointed receivers. The concern are capitalized at \$500,000 and have manufacturing facilities in Bradford and Pittsburgh and warehouses at a number of places in the oil regions. It is said that the embarrassment of the firm is due to inability to make collections, and also to the fact that their manufactures have been sold at prices equal to cost, and in many cases below cost, for some time. If opportunity is given to

realize on assets, it is believed by those who are familiar with the affairs of the concern that the creditors will be paid in full.

The works of Pedrick & Ayer, Philadelphia, manufacturers of machine tools, are now running ten hours a day, under the management of the assignee. It is stated that a new company is being formed for the purpose of taking over the business of the late firm, and that Mr. Pedrick will be one of the largest shareholders.

Gove & Higgins, Norwalk, Ohio, have suffered a loss of about \$8000 by the burning of their foundry.

The Berlin Iron Bridge Company, East Berlin, Conn., have announced a reduction in wages.

Charles Place, machinery commission merchant, doing business under the name of the New York Machinery Depot, in Frankfort street, New York, has made an assignment. He started the business in 1886, and is said to have lost a considerable amount of money by the failure of a Jersey City iron works.

Over 70 men were laid off in one week recently at the A. A. Griffing Iron Works, Jersey City, N. J. A still further reduction in force is anticipated.

Frick Company, manufacturers of machinery, steam engines, boilers and ice-making and refrigerating machines, at Waynesboro, Pa., are operating their plant a portion of the time only, with about one-seventh of their usual force, or 100 men out of 700. The manufacturers of that section have felt severely the effects of the hard times and have yet to see signs of immediate improvement.

Dupont Mfg. Company, St. Johnsbury, Vt., builders of improved power hammers, have recently shipped machines to several hardware and carriage manufacturers. One of the strong points claimed for these hammers is economy in the use of power, which has been particularly noticeable when electric motors are used, the motors showing a low consumption of power.

The boiler shop of Deppe Brothers, at St. Louis, Mo., has been completely destroyed by fire. The structure was 100 x 160 feet in size and was valued at \$7000, including contents.

John Trix has broken ground at Detroit, Mich., for a new brass foundry to cost \$10,000.

The Fulton Truck & Foundry Company have been incorporated, with a capital stock of \$80,000, to carry on business at Mansfield, Ohio.

The Whitin Machine Company of Whitinsville, Mass., have started their works on full time, but have reduced the wages of their employees.

Morse, Williams & Co. of Philadelphia have purchased a site adjacent to their works, and are erecting a one-story brick building for the accommodation of their hydraulic department, their present quarters being inadequate. They are meeting with a good demand for their direct electric passenger elevator, and among recent installations have been the following: In Philadelphia, Lit Bros.' new dry goods store, Eighth and Market streets; Evans' drug store, Eleventh and Chestnut streets, and Ivins, Dietz & Magee's new building (freight elevator also), Twelfth and Market streets. In New York, the Frederick Ayer Building, 79 Franklin street; John F. Dillon's building, 671 Madison avenue; David Hepburn's building, 54-56 Stone street, and Chas. Lesinszky's building, 45 Vesey street; the Price Building, Scranton, Pa.; Kline & Eppihimer's dry goods store, Reading, Pa., and the Carman & Ribsan office building, Trenton, N. Y. Among work now under way are orders from the Babcock & Wilcox Company and G. L. Lawrence, New York; Nashville, Tenn., for the Masonic Building there; Richmond, Va., and Portland, Ore.

The Barr Pumping Engine Company of Philadelphia are engaged in the construction of four vertical steam pumps, each having a capacity of 5,000,000 gallons, for the city of Cincinnati. Among recent orders taken by the company is one for a compound condenser pump of 2,000,000 gallons capacity for the West Chester Water Works, West Chester, Pa.

Hardware.

Buck Bros., Millbury, Mass., who have for some time been running four and one-half days a week are now running five and one-half days a week.

The employees of the Clinton Wire Cloth Company, Clinton, Mass., will soon suffer a reduction in wages of from 3 to 20 per cent.

The plant of the Marlin Arms Company, New Haven, Conn., will for the present run only eight hours per day.

H. C. & W. S. Cloe and L. E. Ford & Co., manufacturers of tacks, Kingston, Mass., are again running their factories, but only half the usual number of machines are in operation. They hope to run on full time with their full number of machines within a few weeks.

The employees at the plant of Richardson Bros., Newark, N. J., operated by the National Saw Company, have been notified of a reduction of about 10 per cent. in their wages.

The nail mill of the Laughlin Nail Company, Martin's Ferry, Ohio, which has been shut down for several weeks, on account of inability to make shipments during the low water in the river, resumed in full on the 7th inst., giving employment to 800 men.

The Dulancy Nut Lock Company have been incorporated at Rice Lake, Wis., with a capital of \$100,000. The incorporators are J. G. Dulancy, W. H. Bundy and A. L. Ulrich.

Romer & Co., manufacturers of padlocks and latches, at Newark, N. J., are very busy filling orders with their full force of hands. This house, though old in years—having long since passed the half-century mark—are youthful in vigor and enterprise, and are constantly adding new and desirable features to their catalogue.

The Chicago Horseshoe Company, 908 Ashland Block, Chicago, have completed the improvements in their works at East Chicago, Ind., and are now placing their shoes on the market. The company have their own rolling mills and roll their own bars.

The Miller Bros. Cutlery Company, Meriden, Conn., have notified their employees that if the duty on pocket cutlery as embodied in the Wilson bill becomes a law it will be necessary to reduce wages from 40 to 50 per cent. No deductions in wages will be made this month, but it is announced that if the company start up after January 1 they will probably reduce wages not less than 25 per cent. If the bill finally passes in its present form still further reductions may be expected. The company state that they will use every means to have the schedule amended favorably and give their employees the benefit of it. The above statement is made thus early that any of their operatives who desire may have ample opportunity for seeking work for next year in better favored occupations.

After a long shut down the spring and axle works of Wood, Smith & Co., Fort Plain, N. Y., have resumed operations in full.

The works of the H. M. Myers Company, at Beaver Falls, Pa., which have been idle for some months, resumed operations in part last week. In accordance with notice given some time before operations were resumed, the employees who applied for work agreed to accept a slight reduction in salary. The firm were compelled to refuse positions to many, owing to the fact that there were so many applications made and on account of starting up only a portion of their plant.

Last week the report of W. C. Hine, receiver of the Youngstown Stamping Company, Youngstown, Ohio, was filed in court. The report shows that from February, 1893, to May, 1893, \$12,911 was received and \$12,335.28 paid out; in May \$20,263.78 was received and \$19,966.09 paid out; in June \$11,983.65 was received and \$12,377.70 paid out; in July \$7402.77 was received and \$7588.14 paid out; in August \$7943.65 was received and \$7089.34 paid out; in September \$7402.88 was received and \$7721.32 paid out. This leaves balance on hand, October 31, \$889.11.

The Columbia Gray Iron Company, Columbia, Pa., having their New York office at 35 Warren street, in charge of O. N. Stein, report a fair business and are running on full time.

W. F. Pardee, salesman for Frazer & Jones Company, manufacturers of saddlery hardware at Syracuse, N. Y., visited our Chicago office last week on his return home from a four weeks' trip through Iowa, Nebraska, Minnesota and Wisconsin. He reported an excellent trade, considering the condition of business for the past six months.

His largest business was secured in Iowa and Nebraska, where he found stocks completely exhausted in jobbers', dealers' and consumers' hands. It is a pleasure to note such experiences in the midst of the general complaints of extreme dullness.

New York Wire Cloth Company, New York office 280 Broadway, have about completed additions to their York, Pa., works, made necessary by the total destruction of one of their factories, at Hamilton, N. Y., June 2, last. The machinery is of the newest models and most improved kind, and in operation will double the capacity of that plant. They estimate that, based on ten hours each for 300 working days, they will be able to produce 25,000,000 square feet of wire cloth per year.

In our issue November 30 we stated that the handle finishers employed by the Goodell Company, Antrim, N. H., had refused a reduction in wages and went on strike. This statement was not, however, accurate, the facts being that when the reduction in wages was announced only eight of the 25 handle finishers remained away from work, all of them for one day, and a part of them for a few days longer, in order to inquire into the situation. One out of the eight left town, and the balance all went to work a few days later. There had been no organization and nothing that could reasonably or properly be called a strike.

Niagara Silver Company, Niagara Falls, N. Y., have for some time been engaged in manufacturing sterling silver souvenir spoons. Several months since they took possession of their large new factory erected in the early part of this year and thoroughly equipped with modern machinery and appliances for manufacturing sterling silver and various grades of plated and unplated flat ware. W. A. Jameson is the manager of the concern.

The Shelby Steel Tube Company, Shelby, Ohio, have not only thoroughly established themselves in the United States, but they are also selling their goods in Nova Scotia, New Brunswick and Canada, and receiving inquiries from England and Australia. This demand is due to their process, by which they claim they are enabled to draw lighter gauges and finer qualities than their foreign competitors have thus far been able to produce. Last year they state that they sold nearly their entire output to American manufacturers, and could have disposed of more had they been in a position to produce the same. They have, however, increased their facilities so that they are now able to supply more than is required in America. Among the company's patrons are many of the bicycle manufacturers of the United States and some in Canada. They advise us that they have, of course, to contend with the prejudice respecting this as well as other innovations by American manufacturers, but they state that this feature of the trade is disappearing rapidly.

Sargent & Co., New Haven, Conn., began on the 4th inst. to work six days a week, eight hours a day. During the past two months the company, who employ over 2000 persons, have been gradually increasing the number of hours of work, so that now the factory is running only one hour a day less than the usual winter schedule.

The Canastota Knife Company, manufacturers of fine pocket cutlery, Canastota, N. Y., are running six hours per day.

Miscellaneous.

The Shultz Belting Company, St. Louis, are having a fair trade. Among the recent export orders entered on their books they mention one of 200 feet of different width belting to be shipped to London, England. They sent a large shipment to a point in Russia some time since, and have received a letter from the firm using the belting stating it was satisfactory.

The Northwestern Car & Machine Company of Oshkosh, Wis., passed into the hands of a receiver on the 21st inst. Serious allegations are made against the promoters of this company. Representations were made by them last spring that heavy Eastern railroad capitalists were looking for a location for the establishment of the largest car works in the country. They asked about 25 acres of land and \$25,000 in cash to locate works in which several hundred thousand dollars were to be expended. The bonus was not to be called for until the works were actually turning out ten complete cars a day. Wooden buildings were put up with paper roofs, and a large lot of machinery was put in, but before the works were ready to

run they called for their money, which the citizens refused to pay. Liens had been filed on about all the property and a chattel mortgage on the machinery. Several suits are already pending by the creditors. J. L. Brown of Montreal, one of the company, seems to have advanced \$3600 on unsatisfied judgments. The following additional claims were also filed: Niles Tool Company, Chicago, \$22,000; the Fay & Egan Company, Cincinnati, \$18,000; W. D. Allen, Chicago, \$1200; Burtis & Howard, Minneapolis, \$13,000; E. P. Allis, Milwaukee, \$8000, and various Oshkosh parties several thousand more. There are possibly other outside claims. It is probable that more or less litigation may grow out of the complication.

Among recently authorized corporations in Illinois are the following: National Ventilating Company, Chicago; capital stock, \$100,000; incorporators, Carlos B. Sawyer, O. H. McConaughy and A. A. Barrett. Whitacre Air Brake Company, East St. Louis; to manufacture air brakes; capital stock, \$500,000; incorporators, William C. Whitacre, John F. Baumgarner, Shepard Knapp. Stephenson Mattress Machine Company, Chicago; capital stock, \$100,000; incorporators, Edwin Stephenson, John E. Anderson and John H. Whipple. Sterling Metal Company, Chicago; capital stock, \$30,000; incorporators, Fred. W. Cook, W. W. Griggs and H. B. Moronas.

The firm of Marlin & Co., Allegheny, Pa., manufacturers of water conductors, eave troughs, metallic skylights and galvanized iron cornices, have been succeeded by the firm of Marlin & Co., Incorporated, the change going into effect on Friday, December 1.

The Baldwin Locomotive Works, Philadelphia, Pa., have received an order for 71 locomotives for the Atchison, Topeka & Santa Fé Railroad; 42 are to be constructed immediately and the remainder before the close of the year 1894.

Owing to lack of orders and general dullness in railroad business, the Wason Mfg. Company's car shops at Brightwood, Mass., have closed for an indefinite period. About 250 employees were laid off, only a few being retained to complete orders now under way.

The Lebanon Mfg. Company, Lebanon, Pa., have announced a cut in wages in all departments, varying from 6 to 10 per cent. Over 200 men are affected.

The plant, machinery and stock of the Vienna Enamel & Stamping Company, at Porter, Ind., have been sold by Receiver Eckels to Gustav Wilke of Chicago, for \$38,000. It is said that the purchaser represents a new organization who will put the plant in operation at once.

A considerable reduction has been made in the working force of the Bath Iron Works, Bath, Maine.

The Erie Car Works property, at Erie, Pa., has been leased by the Lake Shore Railroad Company, and the plant started with a force of 75 men, which will shortly be increased to 200.

A number of men have been put at work in the malleable iron department of the Walter A. Wood agricultural implement plant, at Hoosick Falls, N. Y., and it is expected that the force will be gradually increased.

Witherbee, Sherman & Co. of Port Henry, N. Y., have begun the operation of two of their mines on full time, to be continued during the winter, by reducing the wages of their employees to \$1 for pit hands and 91 cents for bank men.

The brick work is completed for a plow factory at Superior, Neb.

Ground has been broken for the erection of the buildings of the Litchfield Car Works, at Memphis, Tenn. The work is prosecuted under the care of Superintendent J. M. Maris. One of the leading officers of the company says they will erect a great deal of new machinery at Memphis. Besides using the material that has done service in the shops at Litchfield, the plant will be improved by the use of machinery of the latest patterns. This machinery has been purchased and is awaiting orders to ship to Memphis. He also says that within four months the company will be manufacturing cars in Memphis. The new plant will be called the Memphis Car & Foundry Works.

Henry W. Dunlop, Charles L. Dunlop and John C. Post have filed articles of incorporation of the Orvis Steel Arch Fur-

nace Company, at Milwaukee, with a capital stock of \$50,000. The purpose is to manufacture and sell the Orvis patent furnace in Wisconsin.

P. H. Halpin, receiver for the Dubuque Brass & Metal Works, at Dubuque, Iowa, has filed his report. It shows that the total liabilities of the company are \$66,499.83, while all that was realized from the sale of the works, &c., was about \$30,000. If a general division of the proceeds were ordered the creditors would receive considerably less than 50 cents on the dollar. The works were sold for \$15,000.

The Steel Brick Siding Company, Fulton, Ill., are adding new machinery to their plant and making numerous improvements. The company will soon place on the market a line of new specialties in steel roofing, siding and ceilings.

The Standard Wheel Company are increasing the number of employees in their works at West Indianapolis, and have started up their branch plants at Terre Haute and Kalamazoo. If business continues to improve they will put in operation their branch plants at Fort Wayne and Sandusky.

The Moline Malleable Iron Works, at St. Charles, Ill., have begun operations with a force of 20 men. They were formerly located at Moline, but removed to St. Charles after the foundry was burned. The plant has but recently been completed.

Among recently authorized corporations in Illinois are the following: Anderson Coke, Gas, Power & Reduction Company, Chicago; capital stock, \$10,000,000; incorporators, James C. Anderson, Frank J. Smith and James B. Gascoigne. Shailer & Shniglau Company, Chicago; general engineering and contracting business; capital stock, \$125,000; incorporators, Robert A. Shailer, Charles R. Shniglau and Robert P. Lamont. George W. Pitkin Company, Chicago; to manufacture paints; capital stock, \$50,000; incorporators, George W. Pitkin, Walter A. Mayo and Roger S. Pitkin. The Chapman & Davison Company, Chicago; to manufacture tools and machinery for the use of confectioners, grocers and bakers; capital stock, \$25,000; incorporators, Mark J. Chapman, John C. Davison and Matthew J. Chapman. Duplex Smokeless Furnace Company of Illinois, at Chicago; capital stock, \$25,000; incorporators, Edward W. Cullen, C. A. Murray and T. R. Sylvanus. Griffin Wheel Company, Chicago; to manufacture car wheels; capital stock, \$1,000,000; incorporators, Thomas A. Griffin, Gardner G. Willard and William W. Evans.

The Ten Mile Coal & Coke Company of Clarksburg, W. Va., have been granted a charter of incorporation, with a capital of \$1,000,000. This concern purchased about a month ago 2800 acres of coal lands on Ten Mile Creek, which they propose to develop. T. Moore Jackson is prominently identified with the company.

The plant of the Niagara Machine Company, at Kensington, N. Y., which has been closed some time, has resumed operations under a new management. The company manufactured steel balls, pedals, bearing cases and other cycle fittings. Thomas H. Spaulding of Orange, N. J., is now proprietor. One hundred and fifty men are employed. Wm. H. Crosby, formerly secretary and treasurer of the old company, is manager. Associated with him are Wm. H. Hill and Theodore J. Tellefsen, the latter being superintendent. Both were connected with the old company.

The F. J. McCain Company, 439 The Rookery, Chicago, have purchased a piece of ground at West Twentieth street and the Panhandle Railroad, Chicago, on which they intend to erect a plant for fitting structural work. The company are general contractors.

The Thompson Belting Company are installing the machinery in their new plant at Harvey, Ill., and will shortly be in position to manufacture leather belts. This factory is a recent acquisition for Harvey.

The assignees of the Grant Locomotive Works, at Chicago, will receive until January 15, 1894, sealed proposals for the purchase of the entire property of the company now in their hands. The office of the assignee is at 100 Washington street, Chicago.

The Anniston Pipe Works, Anniston, Ala., have been sold to a syndicate representing the bondholders, and will be put in operation at an early date.

TRADE REPORT

The heavy increase in the production of Pig Iron shown by our monthly statistics and the known fact that since the beginning of the month there have been further additions to capacity simply emphasize the growing supremacy of the Central West. The increase in question is due almost entirely to the resumption of plants connected with rolling mills and Steel works, who are capturing nearly every order of consequence from the Atlantic Ocean to the Mississippi. In their fierce struggle for business they are making prices that even two months since would have been thought impossible. Even with the lowest basis for raw material the figures accepted for finished material, apparently without hesitation or keen regret, by the Pittsburgh and the surrounding districts leave rival producers unable to account for them. Low as they are, our quotations in the leading markets are nominal. All important business is done at material concessions.

If there were any evidence that the low sellers are filling up there might be some hope for the near future, but thus far there is no indication that any of the hungry giants are even temporarily gorged. One by one the weaker mills are withdrawing to await better times.

In Steel Rail circles the only incident has been the announcement that the Pennsylvania Railroad has placed an order for 43,000 tons. At other times the purchasing by this road has been very significant, because many smaller roads followed its leadership. This year little is expected in this direction.

For nearly a month it has been persistently reported that Steel Billets had been sold under \$17 at Pittsburgh. We know of at least one case in which it was unquestionably done. Now, however, \$16.75 is an open quotation, and buyers claim that they can do even better.

There has been some recent breaking in prices lately in the Cast Iron Pipe trade, the Jersey City contract for about 2500 tons going at \$19.50 per ton, delivered, while the Washington business was also taken at very low prices. One of the leading authorities in the trade does not take a cheerful view of the future, fearing even greater demoralization.

Chicago.

(By Telegraph.)

Office of *The Iron Age*, 59 Dearborn street, Chicago, December 13, 1898.

At this time of the year not much business is expected in Iron and Steel and sellers are not being disappointed in the prevalence of the usual conditions. There is, however, a lack of the hopefulness with which better trade is ordinarily looked for after the turn of the year. The general expectation is that dullness may continue for some time, or until there is some definite action toward settling the tariff agitation.

Pig Iron—Local Coke is moving rather steadily in small lots for quick delivery, but there is almost no inclination among buyers to place contracts for future delivery. Some figuring is being done, but it is simply owing to consumers keeping themselves posted. Stocks at local furnaces will last for a month or two more at the present rate of shipment, so that there is no immediate prospect of additional furnaces being blown in in this vicinity. Some few sales have been made of Southern Coke, but trade generally has been extremely dull, and even the carload business has dropped to very small proportions. The leading companies are maintaining prices at the rates named last week, but some of their competitors are taking business at lower figures. A sale of about 1000 tons of Lake Superior Charcoal Iron was made to a malleable concern for early delivery at a good price, but the inquiry generally for Charcoal Iron has been quite light. Quotations are now as follows for cash:

Lake Superior Charcoal.....	\$15.50	@ \$16.00
Local Coke Foundry, No. 1.....	13.50	@ 14.00
Local Coke Foundry, No. 2.....	12.75	@ 13.00
Local Coke Foundry, No. 3.....	12.25	@ 12.75
Local Scotch.....	14.00	@ 14.50
Ohio Strong Softeners No. 1.....	15.50	@ 16.00
Southern Silvery, No. 1.....	13.75	@ 14.00
Southern Silvery, No. 2.....	13.25	@ 13.50
Southern Coke, No. 2.....	12.15	@ 12.40
Southern Coke, No. 3.....	11.65	@ 11.90
Southern, No. 1 Soft.....	12.40	@ 12.65
Southern, No. 2 Soft.....	11.65	@ 11.90
Tennessee Charcoal, No. 1.....	16.00	@ 16.50
Southern Gray Forge.....	10.60	@ 10.85
Alabama Car Wheel.....	18.25	@ 18.50
Jackson County Silvery.....	16.00	@ 16.50
Other Ohio Silvery.....	15.00	@ 15.50

Bars—The general demand for Bars has been lighter, although the car business is looking up considerably. Contracts have been placed recently for over 1000 cars by a few railroads and more orders are in sight, aggregating several thousand. The Pullman works have secured a large part of the orders thus far placed, while some have gone to Detroit. A revival of the demand for Car Iron will put the Bar mills in decidedly better shape, as business has been needed for their large trade. Manufacturers' agents note a better movement in specifications on season contracts the past week, as compared with previous weeks. Prices on new business are weak, although nominal quotations on mill shipments continue to be from 1.35¢ to 1.40¢, Chicago, half extras, on Bar Iron, and 1.40¢ to 1.45¢ on Soft Steel Bars. The tendency to use Steel steadily increases, and as more mills enter the market with Steel Bars the price is approaching more closely to that of Bar Iron. The demand for small lots from stock is less active than it has been, but nominal prices are unchanged at 1.60¢ @ 1.70¢ for Bar Iron and 1.65¢ @ 1.75¢ for Soft Steel Bars.

Structural Material—The largest contract recently placed here for Building Shapes comprised about 200 tons for a ten-story apartment house. A brewing company will shortly make an addi-

tion to their plant which will require a considerable tonnage of Beams and other Shapes. Outside of the city prospects are somewhat better, as several large building projects have come forward at Milwaukee, St. Paul, Minneapolis, Denver and other points. The Milwaukee Viaduct hangs fire and there is a possibility that it will be reactivated. Quotations are as follows, Chicago delivery: Beams, 1.65¢ @ 1.75¢; Tees, 1.90¢ @ 2¢; Angles and Universal Plates, 1.60¢ @ 1.65¢. Small lots are sold from stock at an advance of 10¢ @ 15¢ per 100 above these prices.

Merchant Steel—Further buying is reported by implement works, but it is noticeable that these late buyers have cut their requirements considerably below the quantity they took last year. Conservatism is apparent in the agricultural implement line as well as in other branches of industry. Mill shipments, Chicago delivery, are quoted as follows: Smooth Finished Machinery, Tire and Open Hearth Spring Steel, 1.90¢ @ 2¢; Ordinary Bessemer Machinery, 1.60¢ @ 1.65¢; Ordinary Bessemer Tire, 1.55¢ @ 1.60¢; Ordinary Tool Steel, 6¢ @ 7¢; Specials, 12¢ and upward.

Billets—No new business is reported, and quotations are continued at \$19.25 @ \$19.50, Joliet.

Plates—Nothing is doing of any moment in mill business, but sales from stock are a little better than they have been, and the outlook is a trifle better from that standpoint. Mill shipments, Chicago delivery, are quoted as follows: Tank Steel, 1.60¢ @ 1.70¢; Shell Steel, 1.80¢ @ 1.90¢; Flange Steel, 2¢ @ 2.10¢; Fire Box, 2.75¢ @ 5¢. Store prices now prevail as follows: Iron or Steel Sheets, Nos. 10 to 14, 2¢ @ 2.10¢; Tank Steel, 1.90¢ @ 2¢; Shell Steel, 2.20¢ @ 2.40¢; Flange Steel, 2.50¢ @ 2.65¢; Boiler Tubes, 70 and 5¢ off.

Sheets—Black Sheets are weak under continued pressure to sell, but consumers are not inclined to take hold during this month and will wait until January or later to cover their requirements. Quotations are continued at 2.65¢ @ 2.70¢, Chicago, for mill shipments of No. 27 Common, while small lots from stock are selling at 2.90¢ @ 3¢. The demand for Galvanized Iron is by no means so good as in November and prices are drooping. The general quotation on Juniata is 70 and 10 and 10¢ for mill shipments. Small lots from stock are selling at 70 and 5¢ @ 70 and 10¢. Copper Sheets are fairly firm at 25¢ @ 30¢ off, according to quantity.

Rails and Track Supplies—The Pennsylvania Railroad order for 7000 tons is the only business reported here in Steel Rails, except a few carload lots. The Western roads have not yet begun to place their contracts for next year. Quotations are \$25 @ \$27 for Steel Rails, 1.55¢ @ 1.60¢ for Splice Bars; 2.55¢ @ 2.60¢ for Track Bolts with Hexagon Nuts, and 1.90¢ @ 1.95¢ for Spikes.

Old Rails and Car Wheels—Old Iron Rails are weaker. A considerable quantity has been sold at \$12 on the railroad line, but sufficiently near to affect the Chicago market. Old Steel Rails are very quiet. The best offer for short lengths is \$7.25, but sellers ask \$7.75. Long lengths are neglected, while nominally quoted at \$10. Only speculative interest is taken in Old Car Wheels, for which \$11 is offered in quantities.

Scrap.—Business continues in about the same condition as before with the exception of a little better inquiry for Mill Scrap and consequently an advance in the view of dealers as to the value of Wrought grades. Quotations are as follows: No. 1 Forge, \$11; No. 1 Mill, \$8.25 @ \$8.50; Sheet Iron, \$4.50; Pipes and Flues, \$8; Axles, \$16; Horseshoes, \$11; Fish Plates, \$12; Spikes and Bolts, \$10; Cast Borings, \$4.50; Wrought Turnings, \$6.50; Axle Turnings, \$8; Heavy Cast, \$9.50; Stove Plate, \$7.75; Malleable Cast, \$8; Mixed Steel, \$7, gross ton; Leaf Steel, \$14.50.

Metals.—Copper is very firm, but quotations are continued at 11¢ for carload lots of Lake and 10¢ for casting Copper. Spelter is dull, with producers trying to get 3.60¢, but consumers are not even bidding 3.55¢. Pig Lead has declined to 3.10¢, but refiners are unable to secure orders at the reduction.

W. C. Hayward, who has for several years represented Matthew Addy & Co. of Cincinnati, has opened an office on his own account in Room 53 The Rookery, Chicago, as general broker in Pig Iron and Old Material. Particular attention will be paid to Southern Pig Iron, with which he is thoroughly familiar as to brands and qualities. Mr. Hayward has had much experience as a Pig Iron salesman, and is well and favorably known throughout the trade.

H. A. Keith, widely known in the foundry trade of the Northwest, has engaged as general manager of the East Chicago Foundry Company, East Chicago, Ind. The business office of the company is in Room 716 The Rookery, Chicago. Repairs and improvements are now being made and the plant will be put in operation on or about January 1. The company will make a specialty of dry sand rolls and mixtures to meet definite requirements. This is one of the largest among the local foundries and is well equipped for any class of work.

St. Louis.

(By Telegraph.)

Office of *The Iron Age*,
Bank of Commerce Building,
St. Louis, December 13, 1893.

Pig Iron.—The market does not show any change. The local demand runs largely to carload orders and prices are unchanged, as follows, for cash, f.o.b. cars St. Louis:

Southern Coke, No. 1 Foundry	.....	\$13.25 @ \$13.50
Southern Coke, No. 2 Foundry	.....	11.50 @ 11.75
Southern Coke, No. 3 Foundry	.....	10.75 @ 11.00
Southern Gray Forge	.....	10.25 @ 11.50
Southern Car Wheel	.....	17.25 @ 18.25
Lake Superior Car Wheel	.....	16.50 @ 17.00
Ohio Softeners	.....	16.00 @ 16.50

Bar Iron.—A fair trade is reported from mill, but jobbers are not doing much. Prices are weak; mills quote 1.40¢ @ 1.45¢ for carload quantities, half extras, f.o.b. cars St. Louis. Jobbers ask 1.70¢ @ 1.75¢.

Barb Wire.—The demand shows a falling off and prices, while unchanged, are inclined to weakness. Painted is quoted at \$2 in carload lots to jobbers, but this price would doubtless be shaded somewhat. Jobbers ask \$2.10 for Painted and \$2.50 for Galvanized.

Wire Nails.—There is a good trade in Wire Nails, occasioned more or less

by the low prices prevailing. Sales are reported at \$1.35 in large lots from mill. Store price is \$1.50 @ \$1.55.

Rails and Track Supplies.—There is no change to note in this department, except that prices are a trifle lower. We quote as follows: Splice Bars, 1.65¢ @ 1.70¢; Spikes, 1.95¢ @ 2¢; Bolts, Square Nuts, 2.40¢; with Hexagon Nuts, 2.50¢; Links and Pins, 1.85¢ @ 1.90¢; Old Rails, \$13.50; Steel Rails, \$26.50 @ \$27.

Pig Lead.—This metal is in an unsettled condition and price is hard to quote. Buyers bid 3¢ @ 3.05¢, but sellers ask 3.10¢ @ 3.15¢. As the result there is nothing doing except occasionally a carload or two changes hands.

Spelter.—A fair demand is reported for Spelter at 3.50¢, which price is also quoted for January delivery. Choice brands command 3.60¢.

Adolph Butze, St. Louis, Mo., has been appointed sole agent in St. Louis and the territory tributary to it for the sale of locomotive tires made by the La Trobe Steel Works, Philadelphia, Pa.

Philadelphia.

Office of *The Iron Age*, 220 South Fourth St.,
PHILADELPHIA, Pa., December 12, 1893.

The situation in Iron and Steel is practically the same as during the past several weeks. Prices are no better, the demand is no larger, competition is no less severe, neither is the outlook any more settled than it has been since the summer months. There are some indications which might develop improvement, providing that business rested on its merits, but considering the season of the year, and the uncertainty in regard to the tariff, it is not likely that much progress will be made in the direction of greater activity. Nevertheless, there is a growing conviction that prices have reached their lowest, and that on the first signs of a volume of increasing business values will begin to harden. Six months of severe retrenchment is uncovering a great many bare spots, so that purchasing is, in many cases, not a matter of choice, but of necessity, hence it is almost as difficult to postpone business as it is to induce heavy purchases. What is wanted is wanted badly, but beyond that holders find it useless trying to force business. A position of this kind has its compensations as well as its disadvantages, inasmuch as a great many small lots must be taken, even if there is no demand for large quantities. The trade are therefore beginning to feel that there can hardly be anything less favorable in store for them, while there is plenty of room in the opposite direction, so that improvement is only a question of time.

Pig Iron.—The market is extremely dull, and while there are no evidences of large offerings, such demand as there is can be readily met at former quotations. The talk of an advance is certainly premature so far as this market is concerned, although if there was anything like an average demand it is not unlikely that an upward tendency would be developed. For the time being the supply is full and ample, and to secure better prices a larger consumption is indispensable. What there may be after the turn of the year is impossible to say, but for the present there is no likelihood of anything but a very narrow market, with sales at

prices about as follows for Philadelphia and near by points:

No. 1 Foundry	.....	\$13.75 @ \$14.25
No. 2 Foundry	.....	13.00 @ 13.25
Standard Gray Forge	.....	11.75 @ 12.25
Ordinary Gray Forge	.....	11.25 @ 11.50

Steel Billets.—The demand is extremely light, and sales are mostly in small lots—a carload or two, up to 100 or 200 tons. In such cases \$19.75 appears to be the ruling quotation, but for 1000-ton lots, of which there are occasional sales, the price ranges from \$19.25 to \$19.50, one transaction of that kind being reported to-day at the inside figure. It is stated that sales have been made for Harrisburg delivery at \$18.75 for 2000 tons, but we have not been able to confirm it, although it is not unlikely that the report is correct.

Finished Material.—It is very unsatisfactory to report week after week nothing but a dull and declining market, and yet that is all that the facts will justify. Some of the local mills claim to be doing a trifle better on special work, but for anything over 50 or 100 ton lots Western mills scramble after the business almost without regard to price. These who are determined to maintain their reputation for quality refuse to follow the prices made by their Western competitors, on the ground that they must either lose money or sacrifice quality. Consumers, as a rule, are inclined to stand by the manufacturers in this decision, although when it comes to 100 to 300 or 400 tons it requires a good deal of squirming to satisfy both parties. It is positively asserted, however, that material is being delivered from the West at prices which must leave several dollars per ton loss, unless the quality is different to what the buyers claim they are to get. Nothing specially important has been done recently, but there are several projects under consideration which will require several hundred tons each, but they are hardly likely to go through until after the holidays, and even then the uncertainty in regard to the tariff may cause still further delay, so that manufacturers are not figuring with much confidence. Extremely low prices are authorized on them, however, so that if they do not go through it will not be because prices are not low enough, and as a matter of fact, buyers can pretty nearly name their own figures. Small lots are quoted nominally as follows:

Grooved Skelp, delivered	1.45¢ @ 1.50¢
Best Refined Bars	..... 1.45¢ @ 1.55¢
At interior points	..... 1.35¢ @ 1.40¢
Tank Steel	..... 1.45¢ @ 1.55¢
Heavy Plates	..... 1.50¢ @ 1.60¢
Shell	..... 1.60¢ @ 1.75¢
Flange	..... 1.90¢ @ 2.00¢
Angles	..... 1.60¢ @ 1.70¢
Beams and Channels	..... 1.65¢ @ 1.80¢

Old Material.—The demand is of the most unsatisfactory character, as noted for several weeks past, and large lots can only be sold by making lower figures. Nominal prices are about as follows:

No. 1 Wrought Scrap, delivered	.....	\$11.50 @ \$12.50
Machinery Cast, delivered	.....	10.00 @ 11.00
Heavy Steel Scrap, delivered	.....	11.50 @ 12.50
Old Iron Rails, delivered	.....	14.00 @ 14.50
Old Street Rails, delivered	.....	15.50 @ 16.00
Wrought Turnings, delivered	.....	10.00 @ 11.00
Cast Borings, delivered	.....	6.50 @ 7.00
No. 2 Light Scrap	.....	6.50 @ 7.50

C. B. Houston & Co., of 229-231 Bullitt Building, South Fourth street, Philadelphia, have been appointed selling agents for the Sykes Iron & Steel Roofing Company of Niles, Ohio, and

Chicago, Ill., manufacturers of Roofing and Siding, Metal Clapboarding, Metal Ceilings, &c.

Cincinnati.

(By Telegraph.)

Office of *The Iron Age*, Fifth and Main Sts.,
CINCINNATI, December 13, 1893.

There has been a light volume of business in Pig Iron during the week, and while prices are not quotably lower, there was not enough done to really test the tone of the market, there being little more than single carloads sold to jobbing foundries in this district; while there was some demand from the East, reaching as much as 1000 tons in a single order, it was freely met at previous prices. The preliminary statement of stocks of Coke Iron on December 1 shows a reduction of about 32,000 tons in November. There is no urgency to sell, because the larger Southern Iron companies have recently sold so liberally that they are disposed to hold off for a time, but still it is apparent that it would be easier to buy for delivery three or four months into the new year than it was a week ago at the prices now current for prompt shipment. There is much melting of Iron in progress by Iron Pipe works, and there are some contracts in sight for Pipe which may keep this up. The present situation of the trade appears to be no worse. But there are apprehensions of what may occur from the operations of the new tariff. There is some inquiry for Charcoal Iron, but it is not large. Quotations are as follows:

Foundry.

Southern Coke, No. 1.....	\$12.25 @	\$12.50
Southern Coke, No. 2.....	11.00 @	11.25
Southern Coke, No. 3.....	10.50 @	10.75
Ohio Soft Stone Coal, No. 1....	15.50 @	16.00
Ohio Soft Stone Coal, No. 2....	14.50 @	14.75
Lake Superior Coke, No. 1.....	15.00 @	15.25
Lake Superior Coke, No. 2.....	14.00 @	14.25
Hanging Rock Charcoal, No. 1..	18.50 @	19.00
Hanging Rock Charcoal, No. 2..	17.50 @	18.00
Tennessee Charcoal, No. 1.....	14.00 @	14.25
Tennessee Charcoal, No. 2.....	13.00 @	13.25

Car Wheel and Malleable Irons.

Standard Southern Car Wheel	17.75 @	18.00
Lake Superior Car Wheel and Malleable.....	17.00 @	17.25

Forge.

Gray Forge.....	10.00 @	10.50
Mottled Coke.....	9.75 @	10.00

Pittsburgh.

(By Mail.)

Office of *The Iron Age*, Hamilton Building,
PITTSBURGH, December 12, 1893.

Reliable information received during the past week indicates that the foreign makers of Iron and Steel, especially those located in Germany and England, are already making preparations to establish trade in this country in the event of the passage of the Wilson bill. American representatives of foreign concerns have already made quotations on Finished Material for delivery during next year at prices that in some cases are \$3 @ \$4 per ton below present ruling prices, which, as is well known, are much lower now than ever before in the history of the Iron and Steel trades. Their prices are made with cost, freight and insurance paid, and for points near seaboard lower freights could often be obtained than prevail from Pittsburgh or other places of supply. The opinion has been expressed by a competent authority that in the event of foreign makers of Iron and Steel getting a foothold in this country with their products, the next step they will take will be to add modern equip-

ments to their plants, thus further reducing their costs and enabling them to name still lower prices in order to offset any reductions that may be made in this direction by our manufacturers, which, of course, can only be done after material reductions in wages have been made. Now that some revisions in the tariff have already been made, the hope is expressed that fair and impartial hearings will be granted to representatives of those industries that have been placed in peril by this measure and that suitable action be taken before the voting begins. The condition of trade is without material change. Demand for everything is of a hand to mouth character, and will continue so until much of the uncertainty surrounding the future has been removed. Prices are largely in buyers' favor and on some lines are perceptibly weaker.

Pig Iron.—As we approach the close of the year, the demand for Pig Iron grows smaller, and in addition consumers are requesting postponement of shipments to an alarming degree. Buyers of Pig Iron say they can see no indications of the market toning up, and until they do they will continue to buy only as necessity requires. Makers are not able to offer any arguments to offset these statements, and it is the impression that an improvement in the Pig Iron market will not come for some time. Prices of Gray Forge of standard makes are maintained on the basis of \$10.50, Pittsburgh. Bessemer is very dull at \$11, and this price is said to have been shaded on some recent transactions. Foundry Iron is falling off in demand, and prices are lower. Taken as a whole the market is in very unsatisfactory condition, with the outlook for improvement very discouraging. We quote as follows:

Neutral Gray Forge....	\$10.50 @	cash
All-Ore Mill.....	10.50 @	\$10.75
No. 1 Foundry.....	12.00 @	12.50
No. 2 Foundry.....	11.00 @	11.50
Bessemer.....	11.00 @	11.25

We note a sale of 1000 tons of Bessemer for January and February at a price equal to \$11.10, Pittsburgh.

Steel.—While there is a fair amount of Steel changing hands, the tone of the market is weak and prices are somewhat lower. Nearly all orders placed now are for delivery into next year, and while the unexpected sometimes happens, the belief is gaining ground that Steel for the first month or two of next year will rule low in price. We are advised of several contracts placed during the week aggregating some 5000 or 6000 tons, at prices ranging from \$16.75 to \$17, at maker's mill.

Ferromanganese.—There is little doing and we quote 80 % domestic at \$52, delivered. A good order would doubtless shade this price.

Plates and Sheets.—Trade continues very quiet, buyers confining their purchases nearly altogether to small lots. There is sharp rivalry between two leading makers here to capture business, and as a result prices are somewhat demoralized. We quote as follows: Tank Steel, 1.35¢ @ 1.40¢; Shell, 1.55¢ @ 1.60¢; Flange, 1.65¢ @ 1.75¢; Marine, 1.75¢ @ 1.85¢; Ordinary Fire Box, 1.85¢ @ 1.95¢, and Railroad Fire Box 2¢ @ 2.15¢. Trade in Sheets is very quiet and will doubtless continue so for a month or more yet. We quote No. 24 Soft Steel Sheets at 2.40¢; No. 26, 2.50¢, and No. 27, 2.60¢. It is probable that for desirable business these prices would be slightly shaded.

Structural Material.—Pittsburgh is understood to be bidding on considerable bridge work, which will likely be closed between now and the first of the year. In Beams and Channels the demand is slow and altogether for small lots, with no large contracts in sight. It is reliably stated that a Pittsburgh mill has offered to sell Beams at 1.60¢, delivered, with a 20¢ freight rate. We quote as follows: Beams and Channels up to 15 inches, 1.45¢ @ 1.60¢, according to size of order; Angles and Universal Plates, 1.45¢ @ 1.50¢; Tees, 1.70¢ @ 1.75¢.

Steel Rails.—The local mill went on Billets this week, but how long this will continue is not known. Pittsburgh is said to have taken about 12,000 tons of the Pennsylvania Railroad order. It is also reported that a Western road is in the market for about 10,000 tons, which is expected to be let this month.

Muck Bars.—We continue to quote best grades at \$20.50 @ \$21, delivered at buyer's mill. The demand is very light, owing to low prices of Soft Steel Billets.

Wire Rods.—As noted last week, very few Rods are obtainable for delivery this month. For the first quarter of next year mills are asking \$24.50, but for a good order it is probable that this price would be shaded.

Merchant Steel.—Of the five or six concerns in this city making Merchant Steel none of them have sufficient orders to operate their plant to anything like full capacity. It is stated that at one or two establishments operations are being continued in some departments with a view of giving work to employees, and also in the expectation that specifications will come in faster after the first of the year. Prices show no material change, although concessions continue to be made when a desirable order turns up. We quote Bessemer Machinery at 1.50¢ @ 1.60¢; Open Hearth Spring Steel at 1.90¢ @ 2¢; Tool Steel, 5½¢ and upward, according to quality.

Bars.—It is hardly necessary to say that trade is not satisfactory by any means. The demand continues light and prices are weak, with concessions being made right along for desirable orders. While the Valley mills continue to quote 1.30¢ at mill, it is reliably stated that this price has been shaded for favorable specifications. Soft Steel Bars are held at 1.30¢ @ 1.35¢ at mill, with Bar Iron extras. These prices are also shaded, according to desirability of order.

Skelp Iron and Steel.—The demand continues light and no material improvement is expected before spring. Prices continue very low, depending largely upon the nature of the order. We quote Grooved Steel Skelp 1.15¢ @ 1.20¢, and Sheared Steel Skelp at 1.30¢ @ 1.35¢; Grooved Iron Skelp may be quoted at 1.35¢ @ 1.40¢, and Sheared at 1.45¢ @ 1.50¢.

Barb Wire.—The demand is only moderate, although some inquiries are coming in for business for delivery next spring. Makers believe that trade next year will be fully as heavy as it was this year. The low prices ruling are expected to favor purchases to considerable extent. We quote Four Point Galvanized at 2.15¢ @ 2.20¢ in carload lots, and 2.25¢ @ 2.30 in less quantities. We quote Plain Wire at 1.40¢ @ 1.45¢ for Nos. 6 to 9 in carload lots.

Wire Nails.—There is a very satisfactory demand, although prices show

no signs of improvement. Notwithstanding this, however, some mills are refusing to quote for delivery very far ahead at the present ruling rates. We quote Wire Nails at \$1.15 @ \$1.20 in carload lots, the lower price named being for large quantities. Large shipments of Cut Nails to Southern points have been made within the last two weeks by river. We quote Cut Nails at 95¢ @ \$1 in carload lots, the lower price named being for large orders with desirable specifications.

Pipe and Tubes.—There is nothing new to report, the demand being very light, and no material improvement is expected before spring. Prices continue very low, depending altogether upon the nature of the order.

Coke.—Very little has been done so far this month in the direction of closing up contracts for Furnace Coke for the first half of next year. Furnace operators do not seem inclined to be in a hurry to place their contracts, and, on the other hand, Coke makers do not seem inclined to force matters. As to whether lower prices will rule for Furnace Coke is somewhat doubtful, but this will likely be determined within the next week or two. The situation just now indicates that a waiting game is being played to some extent. For the week ending December 2 there were 8181 opens in the Connellsville region in blast and 9332 idle, with a total estimated production for the week of 71,105 tons. We continue quotations of last week, as follows: Furnace Coke, \$1.10; Foundry Coke, \$1.30 to dealers and \$1.45 to consumers. Crushed Coke, \$1.75 to consumers, all in tons of 2000 lb, on board cars in Connellsville region.

New York.

Office of The Iron Age, 96-102 Reade street, }
New York, December 13, 1893. }

Pig Iron.—The market is quiet, some sellers reporting it particularly dull, while others note heavier shipments. It is probably true that more Pig Iron is being melted than for some time since. We quote: Northern brands, \$14 @ \$15 for No. 1; \$13 @ \$14.25 for No. 2; \$12.25 @ \$12.50 for Gray Forge, at tidewater. Southern Iron, same delivery, \$13 @ \$14 for No. 1; \$12 @ \$13 for No. 2; \$11.50 @ \$12.25 for No. 3; \$11.75 @ \$12.25 for No. 2 Soft, and \$12.25 @ \$12.50 for No. 1 Soft. Gray Forge is \$11.25 @ \$12.

Spiegeleisen and Ferromanganese.—Advices received here indicate that the Ways and Means Committee has modified the proposed duty on Ferromanganese by reducing it to 10 %. There is no business in the foreign article at the present time. We quote: Spiegeleisen, 10 % @ 12 %. \$21.50 @ \$22, and 20 %, \$25.50 @ \$26, on cars, Jersey City. Ferromanganese remains nominally \$55 @ \$55.50.

Billets and Rods.—Two of the mills which are closest to this market are hunting for business, the higher grades of Soft Steel being produced by both. We quote nominally: Domestic Billets, \$20 @ \$22, and foreign Billets \$28 @ \$28.50, tidewater; domestic Wire Rods, \$27.25 @ \$28, and foreign Rods, \$39 @ \$39.50, tidewater.

Steel Rails.—The Pennsylvania Railroad has placed 43,000 tons with the three mills along its line and the Illinois Steel Company. It is understood that the Pennsylvania Steel Company reserved a certain tonnage for this order. Outside of this order no busi-

ness of any consequence is reported. The price remains \$24.80 at tidewater.

Track Material.—We quote as follows for small lots: Spikes, 1.70¢ @ 1.90¢; Fish Plates, 1.30¢ @ 1.50¢; Track Bolts, Square Nuts, 2.10¢ @ 2.40¢, and Hexagon Nuts, 2.30¢ @ 2.50¢, delivered. Concessions would be made for round lots.

Manufactured Iron and Steel.—The Iron work for the Kemp Building was taken by a Pittsburgh mill, again emphasizing the fact that Eastern works are unable to capture business. The story is going the rounds that the management of an Eastern mill figured down to cost on a recent job and then took off \$10,000, which they were satisfied to lose in order to receive employment for their workmen, the loss to be borne by the senior partner. In spite of this sacrifice the mill in question was underbid by two Pittsburgh mills. The trade is at sea so far as prices are concerned. We quote nominally: Beams up to 15 inch, 1.65¢ @ 1.90¢, 20-inch, 1.90¢ @ 2.25¢, for round lots; Angles, 1.55¢ @ 1.75¢; Universal Mill Plates, 1.50¢ @ 1.75¢; Tees, 1.80¢ @ 2¢; Channels, 1.65¢ @ 2¢, on dock. Steel Plates are 1.45¢ @ 1.60¢ for Tank; 1.60¢ @ 1.90¢ for Shell; \$1.90 @ 2.15¢ for Flange, and 2.25¢ @ 2.80¢ for Fire Box, on dock; Refined Bars are 1.45¢ @ 1.9¢, on dock, and Common 1.35¢ @ 1.50¢; Soft Steel Bars are 1.45¢ @ 1.70¢; Scrap Axles are quotable at 1.65¢ @ 2¢, delivered; Steel Axles, 1.65¢ @ 1.90¢, and Links and Pins, 1.65¢ @ 1.80¢; Steel Hoops, 1.70¢ @ 1.90¢, delivered; Cotton Ties, 70¢ @ 72½¢ @ 45 lb bundle, at mill; Machinery Steel, 1.45¢ @ 1.50¢; Toe Calk, 1.90¢ @ 2¢ and Sleigh Shoe, 1.65¢ @ 1.75¢, delivered.

Metal Market.

Copper.—The market is quite as complicated now as it was a week ago, with the line of quotations somewhat lower. Contracts for Lake Superior Ingot have been sold on the Metal Exchange at 10.35¢ and at 10.30¢, January delivery. Some lots of actual Copper have been offered on the open market at 10½¢, and it would appear that purchases may yet be made at the latter price, in the face of the strong position assumed by leading producers and certain influential operators. Similar irregularity exists as to market value of other varieties, and while 9½¢ @ 9½¢ is generally quoted for Electrolytic and 9½¢ @ 9½¢ for ordinary casting brands, those prices could probably be shaded in some degree, more particularly on moderate quantities for near future delivery. The market is thus in somewhat uncertain form at the moment, and rather dull. The monthly report of the Bureau of Statistics affords the following comparison of exports from the United States during the ten months ending October 31:

Ore.	1893. Tons.	1892. Tons.
To United Kingdom..	37,353	39,189
Germany	1,043	1,462
Other Europe.....	.....	165
Total	38,396	40,816
Ingot, Bars, &c.	Pounds.	Pounds.
To United Kingdom..	27,920,478	23,403,063
Germany.....	14,111,193	5,259,710
France.....	23,156,134	6,192,210
Other Europe.....	37,154,076	10,116,915
Other countries.....	648,708	99,006
Total.....	101,889,598	24,061,904

Pig Tin.—Prices have dropped off 15¢ @ 20¢ @ 100 lb. The decline is not easily explained except on the supposition that the load carried

by leading holders is more than can conveniently be taken care of at the moment. In other words, the lack of any considerable "short" interest in the speculative branch of the market and very conservative buying on the part of jobbers and consumers leaves solid facts of a weighty nature to be wrestled with. Manipulation is extremely difficult in the face of the situation in London and the uncertainty connected with pending American tariff legislation. Some little business has been done on Metal Exchange contracts at 20.45¢, December delivery, and "outside" sales were said to have been made relatively as low, or say 20.50¢, cash, for 5-ton lots.

Pig Lead.—There has been hardly any business, and efforts in the direction of working up deals have been slimly rewarded. In fact, not only speculative sentiment, but good intentions of operators, seem to have been set aside by uncertainties connected with the new tariff bill. Such as it was, the business has been on a rather lower level of prices—say 3.20¢ @ 3.25¢ for ordinary Western brands for shipment during the balance of the year. Correspondingly low figures were said to have been quoted from leading Western centers. About 500 tons have been sold here.

Spelter.—The local market is almost stationary. There are hardly any orders and the offering is exceedingly tame, with some suggestion that producers are slow to accept orders at current prices. For the present 3.80¢ @ 3.85¢ may fairly be quoted on ordinary Western brands, prompt or near future shipment. Choice brands bring about the usual premium.

Antimony.—For other than jobbing quantities there is little movement. Prices are barely steady at 9½¢ for Hallett's and 10¢ for Cookson's.

Tin Plate.—Business has been extremely tame. Only small orders have come this way for spot goods and the uncertainties connected with the tariff have had a restraining influence upon ventures in futures. Upon the whole, the market shows rather weak tone. Spot quotations are as follows: Coke Tins—Penlan grade, IC, 14 x 20, \$5.30; J. B. grade, do., \$5.35; Bessemer full weight, \$5.35; light weights, \$4.90 for 100 lb, \$4.80 for 95 lb, \$4.62½ for 90 lb. Siemens Steel scarce. Stamping Plates—Bessemer Steel, Coke finish, IC basis, \$5.60; Siemens Steel, IC basis, \$5.65; IX basis, \$6.75 @ \$6.80. Charcoals—Melyn grade, IC, \$6.35; Crosses, \$8; Allaway grade, IC, \$5.60; Crosses, \$6.75; Grange grade, IC, \$5.75; Crosses, \$6.85. Charcoal Terns—Worcester, 14 x 20, scarce; do., 20 x 28, \$11.35; M. F., 14 x 20, \$7.35 @ \$7.37½; do., 20 x 28, \$14.75; Dean grade, 14 x 20, \$5.35; do., 20 x 28, \$10.50 @ \$10.60; D. R. D. grade, 14 x 20, \$5.15; do., 20 x 28, \$10.10; Allyn, 14 x 20, \$5.35; do., 20 x 28, \$10.50; Wasters—S. T. P. grade, 14 x 20, \$4.75; do., 20 x 28, \$9; Abercane grade, 14 x 20, \$4.60; do., 20 x 28, \$8.87½.

A series of interesting experiments of an altogether novel character is about to be carried out at the Government torpedo station at Newport, R. I. The experiments will be under the direction of Commander Converse, and are undertaken with the object of determining the probable effect on the crew of a submerged submarine boat of the explosion of a torpedo near by.

Financial.

Except for a partial resumption of gold exports, the week in financial circles has been almost entirely void of interesting or noteworthy features. Business on the Stock Exchange has been sluggish and shows no sign of improvement. Rather the reverse. There are no indications in the banking, commercial or the industrial worlds of any tangible revival of enterprise or speculation. The whole business of the country seems

The abnormal accumulation of money at the chief financial centers of the country continues to be a source of distress to banking institutions, which are unable to find profitable investment for their unwieldy reserves. This plethora of idle money, loaning at easy rates, is an invitation to speculative excitement, which is a distinct danger, while legitimate enterprise leaves it unutilized. There are signs this week, however, that the maximum of accumulation has been at last reached. The flow of currency from the interior to the center has evidently been checked, as demonstrated by Saturday's statement of the New York banks, which showed a much smaller rate of increase in the surplus reserve than has been the case for many weeks, the week's gain being only \$468,000. The decrease is explained as due to the fact that interior points have sent in all the money they can spare, and to the further fact that Eastern banks are contemplating a reduction of the rate of interest they now allow on the balances of out of town institutions. This explanation is, moreover, verified by the fact that both at Chicago and St. Louis New York exchange is again at par. The New York banks now hold a reserve of very nearly \$200,000,000, the surplus over legal requirements being \$76,500,000. Compared with the surplus reserves for the corresponding week of the last five years these figures are remarkable. They were as follows:

December 10, 1892, surplus	\$5,509,800
December 12, 1891, surplus	15,389,500
December 13, 1890, surplus	607,075
December 14, 1889, surplus	2,680,650
December 15, 1888, surplus	9,672,225

A favorable feature of the bank statement was a further increase in loans of nearly \$3,000,000.

The announcement of export shipments of gold to the amount of \$1,700,000, instead of causing apprehension, as did similar news in the summer, was received with absolute indifference in the money and stock markets. It is realized that a considerable amount of the precious metal can be sent abroad without doing any harm, and the specie can be obtained from the banks without trenching on the Treasury reserve. The curious fact is recorded that one bank alone supplied the whole of the amount shipped, which was sent to Germany. The outward movement is a perfectly natural one, in view of the low rates of interest here and the comparatively high rates ruling in Europe, where money is urgently wanted in some quarters. The banks here are, in fact, able and willing to supply a large amount of gold if Europe calls for it.

Money on call continues in abundant supply at 1% @ 1½%, tending, however, more to the higher figure. Time loans are easy at 2½% @ 3½% for 60 days up to seven months, offerings being considerably in excess of demand. Good mercantile paper is readily marketable, but the supply is not large. Rates are 3½% @ 4% for indorsed bills; 4½% @ 5% for first-class single names, and 5%

@ 5½% for other descriptions of paper. The stock market during the week has been dull and featureless, reaching at the close a pitch of inactivity almost unexampled. Trading was of the narrowest description, and almost purely "professional." Several causes tended to depress the market, including unfavorable reports from a number of Western railroads and Eastern trunk lines, rumors of larger gold exports, and "bearish" tales from Washington, all of which were promptly utilized for "bear" purposes by that contingent. Stocks closed on Saturday dull and heavy, with lower prices almost all along the line. Some London buying on Monday served to hearten the market a trifle, but the publication of the St. Paul traffic returns for the first week in December, showing a decrease of nearly \$200,000, operated unfavorably on that and other granger stocks. Apart from some active manipulation in industrials, Tuesday's market was as dull as could be, closing strong, nevertheless, with an upward tendency in several issues. The following list shows the extreme fluctuations of some of the principal stocks during the week, with closing prices on December 13:

	High- est.	Low- est.	Closing- Dec. 13.
Am. Sugar Ref.	84½	78½	79½
Atchison, T. & S. Fe.	20½	18½	19½
Balt. & Ohio.	72½	72½	73½
Chicago Gas.	68	65½	67½
Chic., B. & Q.	79½	77½	78½
Chic., Mil. & St. Paul.	65½	62½	63½
Chic., Rock Isl. & Pac.	70	67½	68½
Del. & Hudson.	134½	132½	133
Del., Lack & Western.	168	163	164
Gen. Electric.	39	33½	39
Lake Shore.	128½	126	127
Louisville & Nashville.	52	49½	50½
Manhattan.	129	127	129
Missouri Pacific.	25½	24½	25
National Lead, Common.	24½	21½	23½
New Jersey Central.	118	117	118
New York Central.	102½	101½	102½
N. Y., L. E. & Western.	15½	14½	15½
Northern Pacific, Pfd.	22½	21½	22½
Philadelphia & Reading.	21½	20	20½
Richmond & West Pt., Term.	3	2½	3½
St. Paul & Omaha.	39	37½	38½
Union Pacific.	22½	20½	21½
Western Union.	90	87½	88½

Railway and miscellaneous bonds, although irregular, have been stronger and more active than the stocks. Surplus money appears to be finding something of an outlet in these issues, which have generally advanced in price during the past week or two. Government bonds continue firm, with a fractional advance over the rates of last week. The closing quotations were as follows:

	Bid.	Asked.
2s, 1891, registered.	95½	.....
4s, registered.	113½	114½
4s, coupon.	114½	115½

Foreign exchange has been strong and active for the greater part of the week, prices having on several days touched the gold exporting point. The supply of bankers' and cotton bills, although larger, has been readily absorbed by remitters. Toward the middle of this week the market for sterling was a trifle easier, owing to the demand being for the moment satisfied. It is not expected, however, that rates will decline again to any extent at present. Actual business was done at the close at \$4 84½ @ \$4 84½ for 60 days; \$4 86½ @ \$4 87½ for demand; \$4 87½ for cables and \$4 83½ @ \$4 83½ or commercial. Domestic exchange on New York is quoted as follows: New Orleans, commercial 100 discount, bank par; Charleston, buying ½ discount, selling ½ premium; San Francisco, sight 5, telegraph 10 premium; Savannah, buying ½ discount, selling ½ premium; St. Louis, 85 premium bid.

Bar silver closed in London on

Wednesday at 32 pence ½ ounce, and in New York 70¢ ½ ounce. There was exported from New York to London last week \$968,957 of silver, the largest weekly shipment that has been made for a long period. The demand for the metal from Eastern countries appears to be heavy, especially from China. It is thought that this demand will continue active, and consequently that the price of silver is not likely to decline.

Railway earnings reported for the first week in this month are not of an entirely satisfactory character, those from Western roads evidencing a decline in both freight and passenger traffic. The *Financial Chronicle* computes the gross earnings of 74 railroads for the third week of November at \$7,668,323, a decrease of \$556,222, or 6.76%, as compared with the corresponding week of last year; for the fourth week of November 57 roads earned \$8,642,926, a decrease of \$968,478, or 10.08%; for the month of November 88 roads earned \$36,472,124, a decrease of \$2,691,285, or 6.87%.

British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, December 13, 1893.

The line of prices for Pig Tin has averaged somewhat lower. Early in the week buying orders were fairly numerous and served to sustain the market. Some support came also from absorption of supplies received from the East and anticipation of better American support. To-day's market showed rather soft tone, with £76 quoted for prompt delivery, and £77. 17/6 for three months' futures.

Copper prices have remained almost stationary. There has been pressure to sell at intervals, chiefly to realize profits, but good buying acted as an offset later on. The buying included fair lots for home consumers apart from the purely speculative movement. Purchases for India account also helped to sustain the market, but realizations on cash lots had a counteracting influence. At the close the market was steady, with £43. 2/6 quoted for Merchant Bar prompt, £43 for three months' futures and £47 for Best Selected English.

Tin Plate has met with rather better sale. The dealings were chiefly in squares and odd sizes, fair orders for which were placed at some advance on late lowest prices. There has been some improvement also in the demand for all sizes, but lowness of prices offered restricted business. Work has been resumed at the Aberdare mills. Exports last month were 26,000 tons, against 29,000 tons in November, 1892. The quantity sent to the United States was 15,000 tons and 20,000 tons respectively. Stocks at Swansea are now about 222,000 boxes. Liverpool quotations are as follows:

IC Charcoal, Alloway grade.	12/3	@ 12/9
IC Bessemer Steel, Coke finish.	11/3	@ 11/6
IC Siemens.	11/6	@ 11/9
IC Coke, B. V. grade, 14 x 20.	11/3	@ 11/6
IC Charcoal, Terne, Dean grade.	10/9	@ 11/

Pig Lead has met with limited sale, and prices have ruled rather easy at £9. 7/6 @ £9. 10/ for soft Spanish.

Spelter remained quiet, and prices are barely steady at £17 for ordinary Silesian.

There have been no new developments in the markets for Iron and Steel. Business continues moderate through-

English Iron Workers' Wages.

The following statement, which is an exact copy of one issued recently by an English company, will prove interesting to those who wish to make comparisons of English and American wages. It also possesses many curious features which sheet mill men will appreciate :

Edward Jones, Roller. Mill No. 5.

	T.	C.	Q.	lb.	Rate.	£.	S.	D.	£.	S.	D.
STEEL.											
Nail sheets to 15 W. G.	..	..	..	..	10/	..	..	..	..	..	..
Nail or tack, 16 to 19 W. G.	..	..	..	..	11/	..	..	..	..	..	..
Singles to 3-16	*	6	3	5	10/	..	3	5	..	..	..
Singles, 9 to 13 W. G.	*4	9	2	9	11/	24	9	3	..	..	..
Singles, 19 and 20 W. G.	..	9	3	15	13/	..	6	5	..	..	..
Doubles, 21 to 24 W. G.	..	..	..	..	15/	..	..	..	..	..	..
Lattens, 25 to 27 W. G.	..	..	..	..	19/	..	..	..	..	..	..
Ex. Lattens, 28 W. G.	..	..	..	..	21/	..	..	..	..	..	..
5 per cent. off.	..	..	..	..	..	24	19	1	..	..	..
	..	..	..	..	..	1	4	11	..	..	..
IRON.											
Nail sheets to 15 W. G.	..	..	..	..	10/	..	..	..	..	..	..
Nail or tack, 16 to 19 W. G.	*28	6	3	18	11/	14	3	5	..	..	..
Singles to 3-11	*	13	3	1	10/	..	6	11	..	..	..
Singles, 9 to 18 W. G.	*4	5	3	27	11/	2	7	3	..	..	..
Singles, 19 and 20 W. G.	..	19	2	13	13/	..	12	9	..	..	..
Doubles, 21 to 24 W. G.	..	..	..	..	15/	..	..	..	..	..	..
Lattens, 25 to 27 W. G.	..	..	..	..	19/	..	..	..	..	..	..
Ex. Lattens, 28 W. G.	..	..	..	..	21/	..	..	..	..	..	..
Scrap cutting.	51	5	2	14	5d.	1	1	4	..	..	..
Splitting.	..	..	..	..	10 1/2d.	..	3	10	..	..	..
Piles, 14 to 28 W. G.	4	8	8	25	2/2	..	..	..	..	..	..
Total.	79	12	2	4	..	18	15	6	..	..	..
15 per cent. off.	..	..	..	..	..	2	16	4	..	..	..
Turning rolls.	Per fortnight.	..	..	..	..	..	..	..	15	19	2
Assistants, 11 turns.	..	..	..	..	2/	1	2	..	..	10	..
Extra lengths.	..	9	3	15	2/2	..	1	3	..	..	..
Cutting brands.	..	..	..	..	..	..	6	6	1	9	6
Total earnings.	..	..	..	..	..	..	..	..	41	12	10
OFFTAKES.											
Cash advanced.	..	..	..	..	..	10	..	..	..	..	..
Rent.	..	..	..	..	..	..	5	..	..	..	..
Coal.	..	..	..	..	..	..	..	..	..	..	..
Doctor.	..	..	..	..	..	..	..	..	..	..	..
Reading room.	..	..	..	..	..	..	..	..	10	5	0
Society.	..	..	..	..	..	..	..	..	..	..	..
Balance.	..	..	..	..	..	..	..	..	£31	7	10

Roller pays furnaceman and shearer and own help.
Figures marked * represent total output of mill.

out and has been chiefly at prices that have ruled for some little time past. Last dealings in warrants were at 43/10 @ 43/11 for Scotch, 35/10½ for Cleveland, and 45/2½ for Hematite.

Horace B. Silliman, who has been a dealer in manufacturers' supplies at Cohoes, N. Y., for many years, has sold his business to Daniel M. Sutherland, who has been Mr. Silliman's traveling salesman. Mr. Sutherland will continue the business at the old stand.

As we go to press we learn with deep sorrow that George H. Babcock, president of the Babcock & Wilcox Company of New York, is dangerously ill at his home in Plainfield, N. J.

Six hundred idle ovens were lighted in the Connellsville coke region during last week, and the outlook is said to be brighter, orders for coke having been materially augmented by the resumption of work at a number of large furnaces and foundries. The ovens now in blast number 8181 out of a total of 17,513.

The curious features are the wide difference between the grading of gauges and prices paid compared with the American scale. The only respect in which English rolling mill hands have the advantage over Americans is in regard to the extra price paid for rolling large sheets. It will, no doubt, surprise American sheet rollers to learn that in English mills 2 shillings 6 pence per ton extra is paid for No. 15 gauge and lighter if it measures:

Wide. Long.
36 x 90 inches or over.
33 to 35 x 108 inches or over.
24 to 32 x 114 inches or over.

The many variations of his character make it difficult to compare prices by the ton, but it is easy to ascertain the amount earned per capita from the statement shown. The total earnings for two weeks amount to £41. 12/10. This is for 11 turns of 12 hours each, and is divided between eight men and one boy. The average per capita would be £4. 12/6, equivalent in American money to \$22.38, or \$11.19 per week. In an American sheet mill the average earnings, if divided equally between the crew, would be about \$19.50 per week. This statement is made after careful examination of written accounts handed

to workmen by employers. There is nothing estimated or guessed. Notwithstanding the remarkable difference in these figures it is a fact that English workmen work 12 hours per turn, while Americans only work eight hours.

CONTENTS.

	PAGE.
The Bliss Double Spindle Milling Machine. Illustrated.	1085
Novel Annealing Furnace for Tin Mills.	1085
Management of Men and Workshops.—	
III.	1086
New Boiler Makers' Tools. Illustrated.	1087
The Fair Buildings Will Stand.	1087
Recent Progress in the Manufacture of Steel Castings.	1088
The Brown Automatic Fire Alarm System. Illustrated.	1089
The Foundrymen's Association.	1070
California Tire Bender. Illustrated.	1073
The New Phoenix Horseshoe Works.	1073
The Schutte Balanced Horizontal Check Valve. Illustrated.	1074
The Golding Fire Proof Floor.	1074
American Society of Mechanical Engineers. Illustrated.	1075
The Worthington Condenser. Illus.	1080
The Week.	1081
Editorials:	
Plucking up Courage.	1082
Charcoal Iron Under the Wilson Bill.	1082
The Tin Plate Trade.	1082
The Wilson Tariff on Plates and Angles.	1082
The World and the Iron Trade.	1083
Correspondence.	1083
Washington News.	1083
Pig Iron Production Increases.	1084
Manufacturing:	
Iron and Steel.	1085
Machinery.	1086
Hardware.	1087
Miscellaneous.	1088
Trade Report:	
Chicago.	1089
St. Louis.	1090
Philadelphia.	1090
Cincinnati.	1091
Pittsburgh.	1091
New York.	1092
Metal Market.	1092
Financial.	1093
British Iron and Metal Markets.	1093
English Iron Workers' Wages.	1094
Hardware:	
Condition of Trade.	1095
Notes on Prices.	1095
Origin of Hardware Terms.	1096
Bicycles for 1894.	1097
Holiday Show Windows.	1098
Price-Lists, Circulars, &c.	1098
Trade Items.	1098
Ingenious Device for Catching Thieves. Illustrated.	1099
Hardware in South Africa.	1100
Solid Nickel Utensils.	1100
Outfits for Venetian Iron Work. Ill.	1100
It Is Reported—	1101
Paints and Colors.	1102
A Cut Nail Pencil. Illustrated.	1102
The Delmonico Meat Tenderer. Illus.	1103
Wrought Steel Neck Yoke Center. Illustrated.	1103
Unique Self Heating Hair Curler. Ill.	1103
A New Cutlery Box. Illustrated.	1104
Kingsland Wood Rim. Illustrated.	1104
The Gardner Observation Door Fast. Illustrated.	1105
Moore's Storm Window Fastener. Illus.	1105
The Gardner Door Bolt. Illustrated.	1106
Pullman Wrought Steel Spring Hinges. Illustrated.	1106
Banner Oil Lamp Stove. Illustrated.	1106
Current Hardware Prices.	1107
Current Metal Prices.	1114

HARDWARE.

Condition of Trade.

THE middle of December usually witnesses a falling off in the demand for goods and a gradually diminishing volume of business. The present year is no exception, and some special causes are operating to make the aggregate of sales even lighter than usual. In view of the condition of trade more than the usual number of travelers have returned home and are waiting until their efforts will be rewarded by a larger measure of success. The trade, however, on the whole is still being canvassed pretty thoroughly. The conservatism which has characterized business during the past few months is still the policy of merchants, who are limiting their purchases as much as possible until they have taken stock and ascertained the results of the year's or half year's business. At the present time the uncertainty with reference to the action of Congress in the matter of tariff legislation is also having a marked effect and buyers are waiting until this matter is definitely settled. There is, however, a good deal of business doing in a small way, as stocks in the hands of both retailers and jobbers are in most cases more or less broken. There is also a fair activity in seasonable goods and some late orders for articles for the holiday trade help to swell the aggregate of business. Some large buyers have deferred much longer than usual the placing of their orders for the spring trade, and a good many of them are still holding off. The unsatisfactory condition of the market in the matter of prices, especially in staple goods, has not a little influence in deterring merchants from purchasing at this time. While the volume of business is thus only moderate, it is gratifying to note the constant improvement in the financial condition, justifying the expectation that with an early resumption of activity in mercantile circles there will be a satisfactory spring trade. It is especially a matter for congratulation that Hardware merchants throughout the country have so well stood the financial strain of the past few months, and it is hoped that with the turn of the year

there will not be many failures to report.

Chicago.

(By Telegraph.)

The steady winter weather of the past fortnight has enlivened business somewhat in the Shelf Hardware line. It has especially improved collections. The prevalence of snow throughout the Northwest has enabled farmers to market a great deal of their produce and in this way has undoubtedly made money much easier in purely agricultural districts. The movement, however, has not extended to all classes of the Hardware jobbing trade. Manufacturers of Tinware are exceptionally dull. The inventory season is always expected to be of this character, but much less is doing this year than in previous similar periods, and a revival of demand is not expected now until considerably after the turn of the year. The heavy Hardware jobbers also report their business quiet, except in Sleigh stock, which is in particularly good demand and to some extent makes up for the dullness in other departments.

St. Louis.

(By Telegraph.)

Trade during the past week has improved somewhat over the preceding one, but is still considerably less than last year's. The unsettled condition brought about by the proposed Wilson tariff measure continues, and it is pretty generally agreed that any decided improvement is out of the question until this measure is disposed of. A feature of the market is the number of small orders now being received, many of them from large concerns, who were considered carload buyers, but who now buy from hand to mouth. With the exception of a few lines, such as Barb Wire, Wire and Cut Nails and Plain Wire, prices are well maintained. Jobbers do not look for much business between now and the holidays, and are making their preparations for stock taking. Collections are without change.

Notes on Prices.

Wire Nails.—With the advance of the season and the approach of the holidays there is a falling off in the volume of business, but the fact that stocks in dealers' hands are limited is evidently compelling a good many houses to purchase in larger or smaller quantities for a supply of their immediate requirements. Manufacturers also report more inquiry in regard to terms for shipment of fair assortments

early in the year, but jobbers and other large purchasers are quite generally deferring placing their orders. Careful attention is, however, given to the market, and buyers are watching it closely and are preparing to place their orders at the first indication of a turn in the matter of prices. This point, however, has not as yet been reached. Notwithstanding the fact that quotations which have ruled for the past few weeks have been regarded as abnormally low the market has developed a further weakness and some sales have been made at slightly lower figures than were regarded as the extreme prices a week or ten days ago. The market is represented by the quotation of \$1.15 for carload lots at mill, but attractive orders could without doubt be placed at a slight concession from this figure.

Chicago, by Telegraph.—Some manufacturers of Wire Nails are booking orders for good quantities, although the volume of business is by no means so large as that of November. The current trade is, however, not generally distributed, and some concerns complain of a dearth of orders and expect to close down their factories at an early day, not to resume operations until some time in the new year. Prices are irregular, the nominal quotation continuing at \$1.30, Chicago, but it is a comparatively easy matter to secure better terms from some of the manufacturers who are eager for business. The spot cash sellers are again making their appearance to some extent. Jobbers quote small lots from stock at \$1.35 to \$1.40.

Cut Nails.—The Cut Nail market is sluggish and rather weak, being affected by the same influences as Wire Nails. There is some irregularity in the quotations of the different mills, but in the East the market is represented by 90 cents for carload lots at mill, a figure from which concessions are made by some of the manufacturers. There are, however, others who are endeavoring to obtain a slightly better figure. Small lots from store in New York are quoted regularly at \$1.20.

Chicago, by Telegraph.—The Cut Steel Nail trade is quiet and is expected to become more so as the end of the year approaches. Prices are maintained at \$1.15 to \$1.20, Chicago, according to the character of the order. Small lots from stock are selling at \$1.25.

Barb Wire.—The Barb Wire market continues in an unsatisfactory condition, both as regards the volume of

business and prices. The demand is referred to as sluggish, and most of the mills report the aggregate of orders as small. Prices have receded slightly below the point at which they have been held for a few weeks, and the market is now represented by the quotation of \$2.10 to \$2.15 for carload lots of Four-Point Galvanized at mill.

Chicago, by Telegraph.—A great deal of business has been placed recently by manufacturers of Barb Wire with jobbers in the West and Northwest for spring delivery. Prices appear to have been well maintained, owing to the noticeable conservatism of some manufacturers who have usually competed actively for business in this territory. Prices may, therefore, be quoted at \$2.35 to \$2.40 for factory lots of Galvanized, and \$1.95 to \$2 for Painted. Jobbers continue to quote small lots from stock at \$2.55 for Galvanized, but report that manufacturers are more and more absorbing the retail trade.

Cordage.—The manufacturers of Cordage report a light demand, buyers refusing to place orders in excess of their immediate requirements. We have to record a still further decline in the price, the following prices being obtainable on large lots, f.o.b. factory or New York: Manila, 7½ cents; Sisal, 5 cents, and New Zealand, 5 cents. The competition between the different manufacturers continues active. The matter of the reorganization of the National Cordage Company is reported to be progressing satisfactorily, and steps are being taken to consummate the purchase of the plants and property of the National Cordage Company by the Reorganization Committee as trustees.

Cistern and Well Cover.—The Safety Cistern and Well Cover, manufactured by Menefee & De Vilbiss, Fort Wayne, Ind., an illustration of which appeared in our issue December 7, 1893, is sold at a discount of 35 per cent. from the following list:

Size of cover.	Each.
36 inches.....	\$3.85
38 ".....	4.15
40 ".....	4.65
43 ".....	5.50

Superior Hinges.—The Superior Hinge for gates, illustrated in our issue of December 7, 1893, and manufactured by Francis Kell & Son, 163d street, west of Third Avenue, New York, is sold at a discount of 25 and 10 per cent. from the following list:

No.	Doz. prs.
2750, Japanned.....	\$12.00
2750 x 3/0, Copper Plated.....	15.00
2749, Plain Bronze Metal.....	22.50
2749½, Nickel Plated.....	22.50

Youths' Bench.—The Youths' Bench manufactured by the Grand Rapids Hand Screw Company, Grand Rapids, Mich., and illustrated in *The Iron Age* November 30, 1893, is listed at \$8 each, from which a discount of 35 per cent. is allowed.

Extension Hack Saw Frame.—The California Extension Hack Saw Frame,

manufactured by Knapp & Cowles Mfg. Company, Bridgeport, Conn., of which an illustrated description appeared in *The Iron Age* December 7, 1893, is sold at \$12 per dozen, subject to a discount of 25 per cent.

Sash Lift.—The Willer Sash Lift, manufactured by Willer Mfg. Company, Milwaukee, Wis., and illustrated in our issue of November 30, 1893, is sold at a discount of 50 per cent. from the following list:

	Per dozen.
Berlin Bronze.....	\$1.00
Brass.....	2.00
Genuine Bronze.....	2.00
Old Copper finish (on Bronze).....	2.00
" " (on Iron).....	1.50
Nickel plated (on Iron).....	1.50
" " (on Brass).....	2.50

Glass.—No new or interesting features have developed in connection with the Glass trade during the past week. No improvement in demand is noticed, and such orders as are received are for limited quantities for immediate use. There is a disposition on the part of some of the manufacturers who have not as yet started up their works to postpone immediate resumption. Prices at the present time are so uncertain that it is difficult to name quotations that will stand good under all circumstances. Local prices on American Window Glass are referred to as ranging from 80 and 20 to 85 per cent. discount, according to quantity. Pittsburgh prices are reported as being from 85 and 5 to 85 and 10 per cent. discount, while it is understood that Western factories are making still lower prices. Plate and imported Glass show no change in demand or prices.

Origin of Hardware Terms.

THERE is more or less uncertainty as to the origin of many trade terms in general use, and not a few of the designations of various kinds and sizes of Hardware articles are involved in obscurity as to the reason for their adoption. As examples of this the way in which Nails are designated as 10 or 20 penny, the gauge of Shotguns, the numbers of Screws, Caps, &c., will readily occur to our readers. These and similar terms have been unquestionably in use for a long time and the origin of terms is largely tradition, as most of such markings originated with foreign makers before Hardware was manufactured in this country. When similar goods were first made here the designations familiar to the trade were naturally adhered to by the American producers so that confusion might be avoided, in very much the same way as American Tin Plate makers have adopted the foreign terms to designate the different grades of American Tin Plates. Among well informed persons explanations of most of these terms are, however, current, and in many cases there is little reason for doubt as to their correctness. In some instances, however, there are different and inconsistent explanations

given and on these questions there is, of course, more or less doubt. We give below the opinions of well informed parties as to the origin of some of these designations:

The Gauge of Guns.

The usage by which the bore of Guns is designated, as, for example, 12 gauge, is supposed to have originated in this way: The gauge of Guns was determined by the number of pure lead bullets, spherical in shape, any one of which would fill the bore of a Gun. Thus a gun whose bore would be filled by one of 12 such bullets weighing together a pound was termed 12 gauge.

Numbers of Caps.

The numbers given to Caps are supposed to have been arbitrarily given by foreign makers and were continued by American manufacturers when the goods were produced here.

Bastard Files.

The origin of the term "bastard" as applied to Files is generally explained in this way: The rough File was first made, then the second cut. A demand for a File between the two was afterward developed, which being out of the regular line was termed bastard.

Penny Applied to Nails.

Two explanations are current in regard to the use of the term "penny" as a designation of the size of Nails. The one which is very generally adopted is as follows: That the word penny is a corruption of pound. Thus, a 4d Nail was one of such a size that 1000 of them weighed 4 pounds. It may be remarked that originally the term "100" when applied to Nails was six score, or 120, consequently the 1000 was 1200. Another explanation is based on the fact that Cut Nails are comparatively of recent date, having been first made in this country, and were introduced in England as late as 1846. Formerly all Nails were forged, and the price for forging 1000 1½-inch Nails was 4 pence, or as the term is now used, 4d; the price for forging 1000 2-inch or 6d Nails was 6 pence and so on. As a reason why small Nails could be forged so cheaply it is stated that children often did the work.

Numbers of Horse Nails.

The numbers given Horse Nails are supposed by some to have originated in the same way as penny with Cut Nails, according to the first explanation given above. Thus, 1000 of any size weighed the number of pounds designating the number of the Nail. No. 6 Horse Nails would then weigh 6 pounds to the 1000; No. 8, 8 pounds, &c. It is obvious, if this explanation is correct, that the present weight of any number of Nail does not correspond to the original weight of the same number.

Numbers of Screws.

The numbers by which Screws are known designate the numbers of the Screw gauge to which the sizes of the Screws correspond. It would appear that Screws were first made in the various sizes and then a Screw gauge made as a standard, and Wire used in the manufacture of Screws drawn to conform to this standard gauge. The Screw gauge bears no relation to the Wire gauge, as in the case of Screws the largest number designates the largest wire, while in the Wire gauge the largest number represents the smallest size Wire.

Bicycles for 1894.

FIRST ARTICLE.

IN GENERAL OUTLINE the model of the 1894 Bicycle will not differ materially from the 1893 pattern, although improvements on 1893 machines will be introduced by a large number of manufactures. The diamond style of frame, with long steering head and long wheel base, has been so universally approved of that there is likely to be little, if any, change in these particulars.

Weight.—There is, apparently, a tendency toward machines weighing not much over 30 pounds for road use, which weight is made possible without sacrificing strength by the use of tubing of relatively large diameter and light gauge.

Tires.—Improvements in pneumatic tires continue to be made, especially in the ease with which they may be put on and taken off the rims, and in repairing.

Wood Rims are evidently growing in favor for wheels and will be put on machines regularly by some makers. Other manufacturers leave steel or wood rims optional with the purchaser.

Special Features.—Chainless safeties, elliptic sprockets and other features which are peculiar to various machines will find favor with many riders.

Hardware Trade.—There appears to be an increased disposition on the part of manufacturers to market their product through the retail Hardware trade rather than to sell to jobbers, as the best method of getting their wheels before the public, and to give the retailer the extra discount usually received by the jobber. Wholesale houses, will, however, continue to absorb the product of factories, and dispose of the output to retailers and agents.

Prices for 1894.—There is likely to be more of a variation in the list price of 1894 wheels than in previous years. This will allow merchants to supply machines in accordance with the wishes of their customers in quality and in price. The Eagle Bicycle Mfg. Company, Torrington, Conn., announce that their line for 1894 will consist of wheels at the following weights and list prices: 30-pound wheel, \$115; 28-pound wheel, \$125; 25-pound, \$135, and 21-pound machines, \$150. It is not improbable that others of the manufacturers will grade the list prices of their output in accordance with the weight; the lighter machines being listed the highest. The demand for lower priced wheels may result in cheaper wheels being placed on the market. There are still a large number of riders who will be satisfied with nothing but a high priced wheel of the finest finish and grade.

Makers' Announcements.—Many manufacturers have already completed arrangements as to their line of Bicycles for 1894, while others have not as yet perfected their plans for the ensuing year. We will take the opportunity of placing before our readers information regarding the output of the numerous American Bicycle manufacturers at as early a date as possible.

THE STOVER BICYCLE MFG. COMPANY, Freeport, Ill., will again offer the Phoenix wheel on the same general lines as manufactured in 1893, with many marked improvements. The frame will be manufactured with the 10-inch head placed at the proper angle to combine strength with good steering qualities. Their trade has gradually been drifting into a demand for a frame that will fit the rider so as to allow the use of a very short L rod, and for 1894 they will construct frames that will fit riders of any size. They will continue to use Credenda tubing in all parts of their Bicycle, and the bearings on the coming season's output will be dust proof, including pedals, and the important feature in this is that the caps in no wise interfere with the adjustment of the bearing. For handle bars they will manufacture dropped or raised bars with or without brake, as ordered, these bars having different angles. They will use wood rims when so ordered. Their Thoroughbred Phoenix A will be catalogued at 28 pounds, their roadster at 32 pounds; and they will build a special racer weighing 22 pounds. They contend that there is a limit to the light weight idea, and have found that machines of the above weight give the best satisfaction. The company remark that their wheels for 1893 gave universal satisfaction, and that it was upon a stock wheel of the Phoenix pattern that C. E. Henry of San Francisco made his trip across the continent to New York without a mishap.

THE FREEPORT BICYCLE MFG. COMPANY, Freeport, Ill., will make no change in their 1893 models for their 1894 product, excepting that they will add two modifications of their model D, one being with a longer saddle post to accommodate extra tall men, and another with a shorter saddle post to accommodate shorter men or boys who wish a very high grade wheel. For the coming season they will have an improved method for fastening the sprocket wheels, both driving and rear; these are positive fastenings and not liable to give the rider difficulty. The elliptical sprocket gear will remain their special feature, as heretofore. They will also offer an improved saddle which has been thoroughly tested, and for its weight shows great strength. They will make a road saddle with sufficient spring to be perfectly comfortable, at a weight not more than 2 or 3 ounces in excess of the ordinary racing saddle. This is readily adjusted to any desired position for the rider, and to any desired angle upon the wheel.

THE CENTRAL CYCLE MFG. COMPANY, Indianapolis, Ind., announce their line for the coming year to be the Central, model B, a high back double frame machine weighing 24 to 28 pounds, which will be listed at \$150; the model A, a little heavier, will list at \$100, and the Lady Central will list at \$150. The Lady Central will weigh 30 pounds. In addition to these wheels they will have their Ben Hur as a cheap wheel. Their business will be done through dealers, instead of jobbers, as heretofore.

THE CENTURY MFG. COMPANY, Indianapolis, Ind., are successors to the Standard Mfg. Company. They are making a strictly high grade Bicycle, known as the Arrow. Their wheel was gotten out late in the past season, so there will be little or no changes for 1894. The line includes a roadster, scorcher and racer, all under the

general name of Arrow. An 18-pound special racer will also be made, with a 42½-inch wheel base.

THE LEAGUE CYCLE COMPANY, Hartford, Conn., will for the coming year turn out three styles of wheels, all strictly high grade: League chainless roadster, League chainless scorcher, and League chainless ladies' safety. The roadster will weigh 30 pounds, the scorcher 27 pounds and the ladies' wheel 32 pounds. The company do not use chains on any of their wheels, bevel gearing being their special feature for propelling power. The company remark that they feel warranted in entering much more largely into the business than heretofore, as the wheel has met with public favor. They expect shortly to move into a larger building in the heart of the city of Hartford, occupying the entire building, which has a floorage of 30,700 square feet. Nicely fitted offices and salesroom will be located on the first floor, while the balance of the building will be fitted with complete equipment, including considerable new machinery for the manufacture of Bicycles.

HIBBARD, SPENCER, BARTLETT & Co., Chicago, issue a special advance catalogue of their 1894 line of Bicycles. Their line has been very much improved from the highest to the lowest grade. They control the entire product of the St. Nicholas Mfg. Company, and are therefore able, they state, to offer absolute protection and the most advantageous terms to dealers among the Hardware trade, whose business they especially solicit. The catalogue illustrates the Varsity, Courier, Gypsy, Tornado, Queen Mab, Blizzard, Fairy, Cricket, Wanderer and Little Jewel—listed from \$125 to \$20.

HORTON, GILMORE, MCWILLIAMS & Co., Chicago, are not making any changes for next year in regard to Bicycles, their line being as complete and exactly the same as it was last year.

WILLIAM READ & SONS, Boston, Mass., remark that the New Mail has been especially taken up by the Hardware trade the last few years. The pattern for '94 will be changed to conform to the present ideas of frame in having the top bar more horizontal, and the whole machine will be lighter. They will also have a line of medium priced wheels down to \$93, which are largely handled by the Hardware trade, their 1894 models comprising several new features in patterns. This line covers both men's and youths' sizes.

THE EAGLE BICYCLE MFG. COMPANY, Torrington, Conn., will list their 1894 wheels according to weight, as follows: List \$115, weight 30 pounds; list \$125, weight 28 pounds; list \$135, weight 25 pounds, and list \$150, weight 21 pounds. All of their wheels listed at \$125 and over will be fitted with aluminum rims, with which, the company state, they had success throughout the year 1893. Morgan & Wright, Akron, G. & J. and Palmer tires will be used by them, and their \$150 machines will be fitted with the Palmer tire unless otherwise ordered. All their wheels will be built with special deep frames, to enable the rider to carry his saddle at the top of the frame. Wheels listing at \$135 and \$150 will be built under their special copyright design. One of the prominent features will be the cold swaging process to which the tube is treated, reducing large tubes to the required size and tapering the same into delicate forgings, to make the fiber of the tube firm and dense and the temper even. The tapering process begins back about 6 inches from the forging, thus forming a brace on either side, which is designed to make the taper joint much stronger than when

the straight tubing enters into the forgings. The company claim that Eagle taper joints are much stronger than straight joints. Another special feature of their 1894 machines will be handsome decoration in gold on black enamel. This, it is stated, is something new and distinct, and will be put on wheels listing at \$135 and \$150.

F. C. AMES & Co., 335 Broadway, New York, are handling a line of Bicycle Supply Specialties, which they control to great extent. Among these are cork handles, chain lubricant, rubber solution, Dickens' pump and featherweight bell. The handles are of a high grade of cork, with ferrules sufficiently heavy to allow the handles to be driven on, if necessary. The chain lubricant is put up in two sizes of collapsible tubes. The base of the lubricant, we are informed, is plum-bago, and is mixed with liquids other than oil, preventing the accumulation of dust and dirt on the chain. The rubber solution is also put up in tubes. The Dickens' pump is a double acting hand pump, and the bell, a single stroke one, weighs less than two ounces.

Holiday Show Windows.

ADDITIONAL ATTENTION may profitably be given to dressing show windows in anticipation of holiday trade. Activity in this direction need not be confined to merchants who make a special feature of Christmas goods, as those who carry House-furnishing, Sporting and Athletic goods have many articles in stock, which, if presented to the public in holiday attire, will solve for them the vexing question of what to buy for presents. In fact, it is more needful for those to make a display who have not the reputation of handling holiday goods than for those stores to which purchasers would naturally go to have their wants in this direction supplied. At this time of the year customers hold their purse strings less tightly and expect to be more liberal in their purchases than at other seasons. These facts should be taken advantage of, and high priced goods and those which have been hard to dispose of, which might be considered at all suitable for presents, can now be brought forward with good effect. Articles which are old to the merchant, and which he may be disgusted with, are probably new to the majority of his customers, and will repay some labor in putting them in an attractive condition. It may be surprising, after the holidays are over, to see how many of these old stand-bys have taken to themselves wings.

While every one is supposed to know the use of most articles kept in a Hardware store, nicely lettered cards attached to the article, giving its name or use, will attract attention. In addition to the name some sentence, as, "Does your wife sweep?" "How's the old Tea Pot?" "A nice Christmas present!" "Does the boy skate?" "This is no hair splitter, but cuts clean!" &c., attached to corresponding articles, will produce the desired effect in many cases.

Prices marked in plain figures and placed on articles in the window will catch many customers, especially as

many buyers have decided just the amount they will spend for each gift. If the article is made to appear to them suitable and the price comes within their means, an examination of the goods, with a few judicious words from the salesman results in a sale. The purchaser would probably not have come into the store to inquire the price, especially if not in the habit of trading there. The majority of people will buy presents, even if it involves going without some of the necessities, and such prices should be made that will appeal to buyers as bargains. In such times as these merchants may be satisfied with the exchange of goods for the cash, at a slight advance on the cost, rather than expect large profits because it is holiday time.

This principle applies to Christmas window dressing, as to any other—not to have the window crowded. An attractively arranged window, with goods shown as nearly as possible in the manner in which they are used, supplemented by a bright colored sign outside calling attention to Christmas goods, will cause people to stop in front of the store. In making signs, prices and cards for the display goods something better than wrapping paper and a marking brush is demanded. People will judge the quantity and quality of the goods before seeing them, by the quality of the signs. Let these be made by the best sign writer within reach and be done in his best style.

Something green in the window helps the display, as evergreens are so intimately associated with the popular idea of Christmas. Not too much green, but enough to give the window a decided holiday effect; not as if the evergreens got in there by mistake, but showing care and taste in arrangement and that a definite object was in view. An advertisement in the local paper can be used to advantage, in which special attention should be called to the window display. Articles in the window can be changed about each day for sake of variety, other goods substituted, and goods disposed of for future delivery can be marked "sold," showing business is being done.

All the foregoing suggestions are based upon any present stock, without special additions of holiday goods, and the work of getting things in shape for display cannot be commenced too soon.

Price-Lists, Circulars, &c.

BUHL STAMPING COMPANY, Detroit, Mich.: Buhl Lanterns. Circulars illustrate the Buhl Lanterns in colors, showing the Brilliant and Mascot assortments. The Brilliant assortment consists of one dozen square lift tubular Lanterns, assorted colors—red, blue, russet and maroon. The Lanterns are referred to as simple in construction, strong, durable and handsome, always cool to the hand, not going out, with square lift, non-detachable basket guard and safety lock burners. The Mascot assortment includes three square lift tubular Lanterns, two dash Lanterns and one tubular Headlight, finished in hard enameled colors similar to the Brilliant assortment.

MERRIAM MFG. COMPANY, Durham, Conn.: Metal Boxes. The company's line includes Tin Boxes for safe deposit vaults, Fishing Tackle Boxes, first and second quality Cash Boxes, Bond Boxes, Mail Delivery or house Letter Boxes, and hallway Mail Boxes. These goods are described and illustrated, with prices, on a circular.

ILLINOIS REFRIGERATOR COMPANY, 909 Masonic Temple, Chicago: Illustrated catalogue and price-list for the season of 1894. The factories of this company are at Morrison, Ill., and Northville, Mich. Their specialty is the Automatic Refrigerator, whose construction and principles of air circulation are thoroughly described in the introductory pages of this catalogue. The exhaustive way in which these subjects are treated is shown by the fact that 20 pages are devoted to them, all leading points being illustrated or otherwise set forth in a manner to secure the attention and interest of the reader. The Automatic Refrigerator is built with the ice chamber at the side of the box instead of the top. Air circulation is secured by suitable openings at the top and bottom of the intervening partition, so that there are no flues whatever in the entire construction. The shelves are made of woven wire, galvanized after being made. The hardware is of genuine bronze in new designs. The Refrigerators are made of solid ash and mounted on Fox patent casters. Twelve pages are devoted to various styles of Refrigerators for general domestic uses. Then follow apartment house Refrigerators, others for grocers and hotels, Ice Chests, &c., closing with several styles of Sideboard Refrigerators of pleasing designs from small to very large sizes. The territory east of Chicago is supplied with these refrigerators by the Columbia Refrigerator Company, of Northville, Mich.

INDIANA WIRE FENCE COMPANY, Crawfordsville, Ind., have a tasty and convenient calendar with a view of the ruins of White Cross Abbey. Attention is directed to their product, which includes Plain Wire, Barb Wire, Wire Nails, Fence Staples, Wire Stretchers and Post Hole Diggers.

Trade Items.

YALE & TOWNE MFG. CO., Stamford, Conn., and 84 and 86 Chambers street, New York, will issue early in January a catalogue of the products of their new Cabinet Lock department, which they refer to as including a complete line of Cabinet Locks of every kind, size and style heretofore regularly called for by the trade, as well as a number of new and special goods. Simultaneous with its distribution the company will be prepared to furnish customers with price books containing their latest quotations. In view of the early issue of the catalogue and of the completeness of the line which it embraces they suggest that their customers defer placing orders for Cabinet Locks for the coming season until they have an opportunity to examine the work.

AUGUST KREAMER, manufacturer of pieced and stamped House Furnishing Goods, South Third street and Kent avenue, Brooklyn, has bought the plant of Peter Michels of that city, for making Coffee and Tea Pots and a general assortment of Tinware. This will be incorporated with his own factory, and to provide the necessary room he recently added two new stories on the South Third street wing, giving an increased floor space of 6000 square feet. He is about to commence the manufacture of a line of heavy planished ware of four, five and six cross tin, supplementing a large assortment of

goods already long made by him. This will include Chafing, Vegetable and Oyster Dishes, Urns, Tureens, Egg Coddlers, Rice Molds, Butter Kettles, Coffee and Tea Pots, &c. The goods made at this factory are mainly for fine trade, and, when so ordered, have the dealer's name struck in brass affixed to each piece. A full line of culinary and housekeeping ware of heavy tin, copper, sheet iron plain, galvanized, japanned and decorated is already well known to most of the largest dealers and department stores. A new catalogue, for a long time in preparation, will be issued in about two months.

CLEMENT & DUNBAR, 1129 Beach street, Philadelphia, Pa., are calling the attention of the trade to their Home and Rapid Ice Cream Freezers. The Home is a single action Freezer with an automatic adjustable scraper and white cedar tub. The Rapid is a double action Freezer with a tub large enough to allow of covering the can completely with ice without interfering with the working parts. The can, of heavy tin plate, has a solid iron cover and bottom, and is fitted with an automatic scraper which adapts itself to any difference in the surface of the can. At the bottom of the tub is a screw which raises the can, when required, sufficiently to compensate for any sag in the can, or wear in the bearings. It is claimed that the tubs are all full sized and allow of large lumps of ice being used, thus tending to hasten the process of freezing and minimize the labor incident to same. The firm are also makers of the Rapid Ice Breaker, designed for confectioners, hotel keepers, and all who use large quantities of broken ice.

A THIEF broke into the Hardware store of S. O. Burnett, 288 Fulton street, Brooklyn, on the night of the 8th inst. and stole \$70,000 in bonds, mortgages, certificates, &c. In addition he took \$20 in cash and a watch valued at \$50. It is said that none of the securities can be realized upon by the burglar. Their loss to Mr. Burnett, however, should they be destroyed, would amount to many thousands of dollars. The securities were kept in an old-fashioned safe, which was easily broken open by the thief. Excepting the above the robber disturbed nothing else in the store, although within a few feet of the safe in a showcase were a large assortment of Pocket Knives, Tools, &c. The miscreant has not yet been apprehended by the police.

ANNOUNCEMENT is made that Manley W. McClure has retired from the firm of Brown, McClure & Wales, Boston, Mass. The business of importing and dealing in Iron, Steel, Heavy Hardware and metals heretofore conducted under the above firm name will hereafter be continued by John G. Brown and William Q. Wales under the style of Brown & Wales.

UNDER THE HEADING of "It Is Reported" in our last issue appeared a paragraph in which it was stated that the Hardware store of A. L. Mills, Hartford, Conn., had been recently entered by thieves. Mr. Mills is, however, located in New Britain, and his initials are H. L. and not A. L. The value of the stolen booty was less than \$100.

AN ENTERPRISING Brooklyn merchant recently hit on a novel mode of advertising. He purchased several thousands of high grade flat steel keys of a well known lock company, to each of which a tag with blank spaces for name and address was attached. These, with a four-page circular directing attention to many articles for sale, with prices, were inclosed in envelopes, and ex-

tensively distributed in territory adjacent to his premises. In the circular reference was made to the key, saying that 10 per cent. of the keys would fit a lock hanging just inside their door. Every one who succeeded in opening the lock would secure a neat sewing chair. In addition, all the keys entitled the holder to a chance at a handsome parlor suit then on exhibition in their window. After trying the lock the key was dropped in a box for a future drawing for the suit, the tag containing the person's name and address.

Ingenious Device for Catching Thieves.

THE Hardware firm of Foster, Stevens & Co., Grand Rapids, Mich., recently employed electricity and photography to detect a burglar. It being found that their money drawer

vice was fitted on the money drawer, so that when the drawer was opened the shutter of the camera operated, exposing the lens, at the same instant setting off a flash light. The night after the apparatus was first put in place the thief opened the till and the apparatus worked just as had been designed, but the thief, in order not to be seen from the street, had placed himself under the desk and drew the drawer out over his head. Upon developing the plate the following day it was found that a good photograph had been taken, though the thief was not in it. The night man was, however, arrested the following day upon suspicion, and quickly confessed all when asked if he knew that his photograph was taken when the light flashed in his face. The flash light flared up the mo-

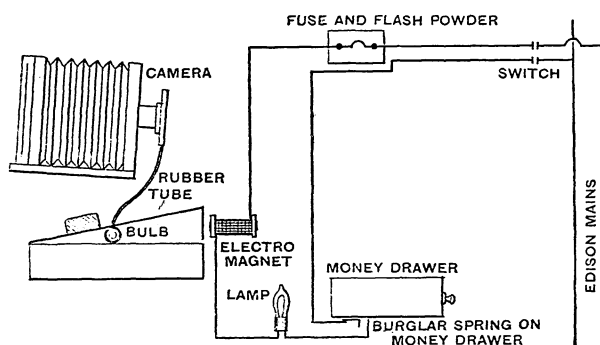


Fig. 1.—Photographic Detection of Burglars.

was systematically robbed at night, W. D. Stevens of the above firm applied to the Grand Rapids Electric Company to devise some scheme by means of which the thief might be detected, and suggested what may be termed the Electro-Photographic method.

The Electric Company's efforts resulted in the detection of the thief, the method adopted being shown in

ment the drawer was pulled out, but the thief continued his work and rifled the till. He came to the conclusion that he had been discovered, and was easily brought to confession.

The second apparatus designed, as shown in Fig. 2, is referred to as working well, but no thief has yet appeared to be operated upon. The plan, no doubt, is capable of wide application. All parts of the apparatus can be so

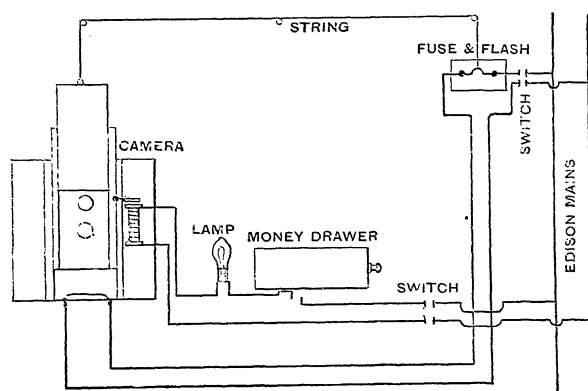


Fig. 2.—Another Arrangement of Apparatus.

the accompanying illustrations. The device as first arranged is shown in Fig. 1, the camera being so placed as to get a front view exposure of a person standing before the money drawer. Electric connection was made with the Electric Company's plant to operate the device. A burglar alarm de-

arranged as to be thoroughly concealed from the eye of the thief. An indisputable and convincing proof of guilt is a photograph of the offender, taken in the act; and the foregoing plan suggests a safe and efficient method of detecting burglars, which is capable of a wide adaption.

Hardware in South Africa.

LETTER FROM

POLHEMUS LYON,

Our Special Foreign Representative.

PORT ELIZABETH, November 6, 1893.

To the Editor: South Africa, with its even million of white people, is growing more and more in touch with the rest of the civilized world.

Our World's Fair is certainly helping to this end. Quite a number of people have lately returned from Chicago, bringing with them not only interesting stories of the fair, but also quite an assortment of new lines of merchandise picked up in the States from exhibits made at the fair.

This is materially helped by the direct line of steamers which leave New York every three or four weeks, and make the 7200 miles direct passage to Cape Town in 30 days. These steamers do not ask any more freight charges than those from London to the Cape, and virtually take no longer in transit, so that many lines which did not interest the colonial buyer when he had to wait for a three months' sailing ship now obtain a demand, and we are put on a more even footing with the European factories. The writer has found it possible to sell several lines because of this, which two years ago would not excite interest. It is to be hoped that the steamers have come to stay, though many of the colonial merchants prefer the sailing vessels, since the more obstacles there are put in the way of importing the less crowded do they find competition. It is a fact that these steamers each bring out a number of first-class passengers, and there are at the great mining centers down here several Americans in charge of large interests, for, of course, the mining machinery in vogue is chiefly from our country.

Cape Town, with its 85,000 people, is taking a step up in the world—that is to say, two or three years ago there were but two or three buildings over two stories high, now there are half a dozen running up to five stories and several to three.

I would take much more interest in the building interests here if they would only use decent Hardware, but the Builders' Hardware in use would shame a third class tenement. They use almost entirely cheap, heavy English Rim Locks, which turn only one way and have an inch and a half brass knob. There are very few Mortise Locks in use and no Night Latches, although in this city the trade have done very well with American Rim Locks, introduced two years ago. In Cape Town they could not be tempted to handle the goods because of the light cast case, and in neither city do they take kindly to our nicely finished Wrought Steel Butts, but prefer, at a higher price, the English Cast Butt.

The building trades have done very well during the year, which helps the Tool lines, where we come in for a large share. Some day we will be

able to meet the mother country on common iron goods, even as we now do on malleables, where we almost invariably score an advantage, but on brass Hardware we are out of it again.

Every day I am told of the increased effort the Germans are putting forth for colonial business. Both in Australia and throughout South Africa they have numbers of sample rooms and travelers seeking importation orders for new lines for that market. Even lately have they come into this field with Plows, which is a very large line at this port. One number of an American Plow coming here to the tune of 30,000 per annum is in popular demand from Kaffirs as well as from the Dutch and English.

But there is one great advantage all over the world in competing with goods of German manufacture—viz., that the buyer takes it for granted that they must be of very inferior quality.

Solid Nickel Utensils.

HERMANN AICH, 43 Murray street, New York, is sole agent in this country of Arthur Krupp, Berndorf, Austria. At this place are extensive works, employing, it is stated, 3500 persons, manufacturing a large line of pure nickel Cooking Utensils. While well introduced abroad, they are said to be virtually new in this market. The utensils are all seamless and guaranteed absolutely pure nickel, also acid proof. Unlike copper goods of this character, they are always ready for use, while the former must at times be retinned. With ordinary care they are said to be practically indestructible. Probably they will first be used in hotels, restaurants, clubs, institutions, &c., as upon the recommendation of chemists, metallurgists and physicians they have been largely introduced abroad in such places. They are especially recommended for hospitals or wherever food is prepared for invalids. The ware is perfectly smooth inside and has a mirror polish outside, resembling in this respect silver ware. The variety of utensils include hotel deep, medium and shallow Sauce Pots, Stew, Frying and Dripping Pans, Egg Cookers, Fish Boilers, Trays, Cups, Tureens, Gravy Boats, &c., many of the leading articles being made in from 20 to 60 sizes each. A line of the principal goods and sizes will be carried here in stock, while importation orders can be taken for anything on the list. The manufacturer is the brother of the famous gun maker of Essen, Germany.

Outfits for Venetian Iron Work.

A. J. WEED & CO., 106 and 108 Liberty street, New York, are placing on the market, in a popular form, materials for the construction of Venetian iron work. Suitable materials and the few necessary tools constitute the outfits obtainable from the company, by means of which, with designs and instructions, useful and artistic home decorations may be made. The construction of Venetian work is designed by the company for home work, as macramé lace making and scroll sawing have been, it being represented as an easy art to master, gratifying artistic taste, and one which may be made remunerative. It is also suggested that the construction of articles in the store or shop

during dull seasons, designed for sale over the counter, may be found profitable. For the construction of such Venetian iron work by amateurs the company furnishes materials, tools and working designs. The bracket and candlestick, as shown in Figs. 1 and 2, will convey an idea of what may be accomplished by workers in this line.



Fig. 1.—Bracket Frame.

The bracket frame or outline is furnished by the company, or may be made by a blacksmith. The company furnish iron strips of a suitable width, and these are bent and attached to the frame in any design which fancy may dictate.

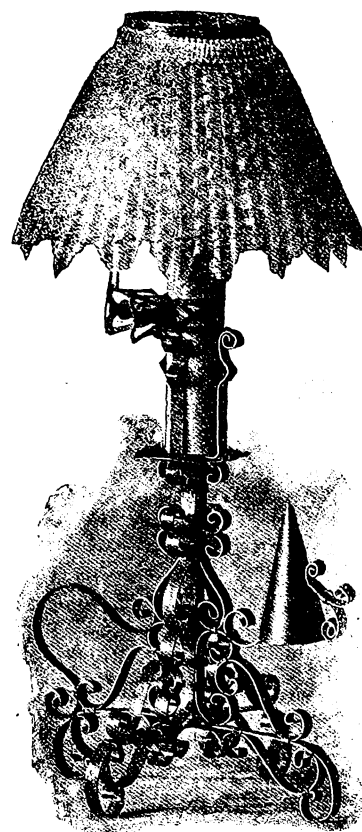


Fig. 2.—Candlestick.

For candlesticks square pieces of iron are furnished for the center or

backbone of the structure, and the strips are fastened to this in curves, angles or any other shapes desired. There is thus opportunity for much taste and skill. The cost of the materials for the candlestick shown, with the shade, shade holder and extinguisher—these three articles being furnished ready made—is 87 cents. It is estimated that about two hours' labor would be required for the construction of the article. These particular designs are only referred to by way of illustration and it is obvious that a large variety of articles can be made according to the taste, ingenuity and skill of each individual.

The materials necessary for this work, as furnished by the company, include strips of Russia iron, copper, brass and aluminum of different widths. These can be obtained in packages or made up into primary designs, as shown in Fig. 3, at a cost of from 10 to 15 cents per dozen.

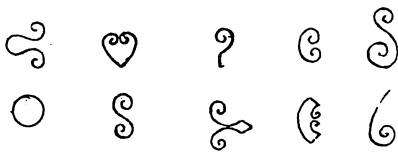


Fig. 3.—Machine Made Primary Designs.

The copper, brass and aluminum strips may be combined in designs to advantage by advanced workers either from working patterns or from original designs. Strips of the various metals are also furnished twisted, fluted, in Grecian borders and in other designs.

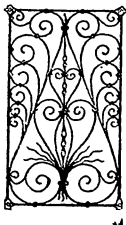


Fig. 4.—Wrought Iron Frames.

Those desiring wrought iron frames similar to those shown in Fig. 4 for windows, doorways, &c., for filling in with designs, or frames for brackets, fire screens, lanterns, &c., can obtain them in regular sizes, or frames will be forged to order from designs submitted. Working designs from which articles can be made are furnished separately, or at an annual subscription of \$1 two full sized working drawings will be furnished each month. The tools required for this work are few and simple and will be furnished by the company if desired. In the construction of the different articles the strips of metal or machine made designs are fastened together with binders furnished by the company at from 5 to 15 cents per 100, according to the metal of which they are made. These are fast-

ened by means of the binder tool shown in Fig. 5.

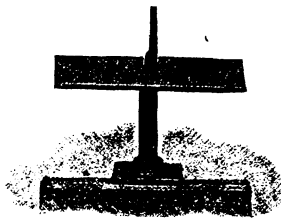


Fig. 5.—The Weed Binding Tool.

The standard of the binder tool is of machinery steel, case hardened, and the working parts are of tool steel. The binders, properly put in place with the tool, impart firmness to the article constructed. Black antique paint, furnished by the company, is used to paint the iron work after the article is completed, to give it a finished appearance.

For the convenience of customers the company put up the necessary tools and materials for making Venetian iron work in sets, varying in completeness according to the needs of the purchaser. There are three sets or outfits thus put up, known as A, B and C. Set A is the beginners' outfit and sells for \$3.50, and contains all that is really necessary. In set B the tools are of a better grade, costing \$6, and in addition there are several other appliances which will be found convenient, besides a greater amount of materials to work with. In set C the tools are of the best quality and everything as complete as the company's experience has made possible. This set costs \$10. The following is the list, with prices, of tools and materials in set B, which is sold for \$6, this being a representative outfit:

The Weed Binding Tool, for vise, with separate base.....	\$1.25
The Weed Forming Tool.....	.25
Vise.....	.50
Iron Shears.....	.50
Cutting Plier.....	.60
Square Nose Plier.....	.30
Round ".....	.40
Tape Measure.....	.10
Antique Paint.....	.50
Paint Brushes, per set, 3.....	.20
2 Hooks.....	.30
2 Backbones for Candlesticks.....	.30
Bracket Frame.....	.35
Package of Iron Strips, 1/4 inch.....	.20
" " " 3/8 inch.....	.05
" " " 1/2 inch.....	.10
" " " 3/4 inch.....	.05
" " " 1 inch.....	.05
Sample of Brass Binders for 1/4 inch.....	.05
Wire, per spool, Iron.....	.05
" " " Brass.....	.15
6 Spring Clasp Pins.....	.30
2 Candlestick Bobechés.....	.10
2 Extinguishers.....	.25
2 Candle Shades.....	.50
2 Extension Shade Holders.....	.35

The point is made that there is almost no limit to the kinds of articles and designs which may be constructed with the tools and materials obtainable; and that these outfits would form an attractive addition to the line of holiday goods for sale in Hardware stores. Samples of ready made articles may be obtained from the company for display.

It Is Reported—

That G. W. Strong, Sherman, N. Y., has sold his stock of Hardware to W. H. Homewood and Henry W. Sperry. Mr. Strong will retain his interest in the sale of carriages and Agricultural Implements.

That J. C. Carter of Minneapolis, Minn., has bought the interest of his uncle, R. D. Boice, in the firm of Boice & Weidlein, Geneseo, Ill. The firm are the oldest Hardware concern in the county.

That Col. B. F. Sheets and Benjamin Knodle have purchased a Hardware store at Rochelle, Ill., of which Mr. Knodle will take charge.

That J. W. McDonald has recently opened a Hardware store at Norfolk, Neb.

That Charles Ellis, Brandon, Wis., has sold out his stock of Hardware.

That J. T. Shannon has sold his stock of Hardware at Madisonville, Texas, to Dr. W. C. Craw.

That a few Revolvers were stolen from the store of Evans Brothers, Roanoke, Va., on the night of the 20th ult.

That Fimrite & Hauge, Elmore, Minn., have purchased a stock of Hardware at Buffalo Center and are in charge.

That James M. New, Hardware merchant, Martinsburg, Iowa, has traded His Hardware store for a farm.

That the Hardware store of T. L. Burnett, Fort Worth, Texas, was entered by burglars on the 23d ult., and a large amount of Cutlery stolen, including Knives and Razors—in all about 20 dozen.

That A. Bahlke has disposed of his Hardware stock at North Star, Mich.

That a Hardware store is being erected at Wayne, Ill., for Ray Boynton.

That Mr. Bingham of Bay City has entered into the Hardware business with J. T. Harvie at Farwell, Mich.

That Burke Bros. of Ellsworth, Minn., have purchased the Hardware stock of M. E. Templer & Co., Trosky, Minn., and have removed it to Ellsworth. An opening is thus left for a Hardware store at Trosky.

That burglars entered the Hardware store of J. A. Boggs, Davenport, Neb., on the 29th ult., and stole about \$30 worth of Razors, Pocket Knives, Revolvers, &c.

That Geo. H. Cutter of the Hardware firm of Cutter Bros., Meadville, Pa., shot and killed a burglar while in the act of ransacking the store on the night of the 21st ult.

That E. R. Morrill, senior manager of the Hardware firm of Morrill & Lackey, Woonsocket, S. D., has sold his interest to Fred. Dring.

That Ott & Boden's Hardware store, at West Bend, Wis., was burglarized on the 24th ult. and \$150 worth of Knives and Revolvers was taken.

That in a fire at Fort Worth, Texas, on the 23d ult., the Hardware and Stove stock of Lathrop & Co. was damaged by water to the extent of \$200.

That the Tompkins-Cary Hardware Company have filed articles of incorporation at Denver, Col. The capital stock is \$100,000. The directors are John Harvey, T. J. Cary, D. La Salle, H. H. Tompkins and S. H. Tompkins.

That S. H. Gay and Henry Gebhardt will soon open up a new Hardware store and Tin shop at Carbon, Wyo.

That Foster & Burke, Hardware merchants, Petoskey, Mich., have bought out Williams & Carpenter, and now control most of the Farm Machinery business in that place.

That Christopher Wiemer has bought out his brother's share in the Hardware firm of Wm. Wiemer & Co., Radcliffe, Iowa.

That the new establishment of the Stratman Hardware & Builders' Supply Company, Huntingburg, Ind., is nearly completed.

That the Star & Bullock Hardware Company, Deadwood, S. D., have purchased the plumbing business formerly conducted by the Deadwood Plumbing Company.

That in a large fire at Milan, Mich., on the 4th ult., the Hardware stock and building of O. A. Kelley were destroyed. Loss, \$10,000; insurance, \$4000.

That Max Ludwig's Hardware store, at Pittston, Pa., was robbed on the 1st inst. Sixty dollars' worth of goods were carried off by the miscreants.

That Charles Bowen contemplates entering the Hardware business at Crooked Creek, Iowa.

That Eastwood & Chase are a new Hardware firm at Monticello, Iowa.

That William Walker, senior member of the Hardware firm of William Walker & Son, Peoria, Ill., has retired, his place being taken by William T. Wookey.

That Lindley & Morrissey have sold out their Hardware business at Edgerton, Wis.

That robbers blew open the safe in Oliphant & Newby's Hardware store, at Kennard, Ind., on the 5th inst., but secured no money.

That E. A. Jackson, who for 27 years has carried on the Hardware business at Chatsworth, Ill., has sold out to Sneyd & Burns.

That the Hardware store of D. L. Shultz, at McFall, Iowa, was recently burned out.

That L. Romans has purchased the interest of George Knight in the Hardware business at Charter Oak, Iowa.

That the Hardware firm of J. A. Marshall & Co., Manito, Ill., are putting in a plate glass front and have torn out their old office in the front of the store and built a large new one in the rear.

That the new block built for the Stambaugh-Thompson Hardware Company, Youngstown, Ohio, is now ready for occupation. It is an especially fine one and admirably adapted to the requirements of the business.

That Geo. Bowen has sold his interest in the Hardware firm of Kelly & Bowen, Lawrence, Mich., to Elvin Rowland, and the firm style is now Kelly & Rowland.

That the Hardware firm of Koch Bros., Hope, Kan., has been dissolved, Philip Koch retiring. William Koch will continue the business alone. Philip Koch has gone to Oklahoma with a view to locating and re-entering the Hardware business.

That the C. Krueger stock of Hardware and Implements at Lincoln, Ill., was sold on the 2d inst. to Frank and O. Kiest, who expect to continue the business. The stock invoiced at over \$5000 and sold for a little over \$3500.

That the Hardware firm of Sutton & Sharpe, Austin, Texas, have been changed into a stock company, with a capital of \$20,000. Application for a charter has been filed. The following are the directors of the firm: S. K. Brown, G. C. Atkinson, F. W. Carothers, A. L. Sharpe and J. A. Sutton. Officers have not yet been elected.

That A. G. Rummel's Hardware store, on St. Clair street, Toledo, Ohio, was entered by burglars on the morning of the 5th inst. and goods taken amounting to nearly \$300.

That John A. Carman has sold his Hardware store at Pecatonica, Ill., to the E. W. Lowell Hardware Company of Janesville, Wis., who have already taken possession and will conduct it hereafter as one of their branch establishments.

That J. D. Sayers has bought out the interest of his partner, J. A. Jackson, in the Hardware business at Unionville, Mo., and will for the present continue it alone.

That Mr. Adams, who for the past 12 years has been connected with R. M. Bingham & Co., Rome, N. Y., has bought the Stove and Hardware store at 174 West Dominick street, formerly owned by F. W. Clark, who will soon leave for La Porte, Texas, where he has extensive business interests.

Paints and Colors.

It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.

There have been no important developments during the past week. Spot business has been slow, yet probably up to the average for this season of the year, while values do not appear to have undergone anything more than very ordinary fluctuation. Contracts for supplies for future delivery have been fair in some lines, but hardly all that could be wished in point of volume.

White Lead.—The irregularity in price that has existed for some time past continues, but no radical change has taken place. Competition is momentarily rather tame in this quarter, but advices from various other points indicate sharp rivalry and a quite general adjustment of prices to circumstances. This is particularly the case in the instance of Quick Process and various Mixed Lead.

Red Lead and Litharge.—Large consumers are manifesting little interest at the moment, presumably because of the fact that near future wants have been quite well provided for. The demand has been slow as well. Prices show no radical change, but seem to lean more or less in buyers' favor.

Orange Mineral.—Except of moderate quantities hardly any sales are making at present, since there is nothing in the general situation that would prompt liberality in the matter of buying for future wants. Sellers make no unusual effort to expedite business, however, and generally adhere to former prices.



A Cut Nail Pencil.

Zincs.—Some manufacturers report a rather better run of orders latterly, but, as a whole, the market for American brands remains quiet and is bare of really new feature, prices being the same all along the line as quoted for several weeks past. On foreign brands no change in list prices has been made, but there is more or less irregularity and business continues to be on a very moderate scale.

Colors.—Individual orders have been almost invariably of rather small size

and it is the general report that they are hardly up to the average numerically. Competition in most lines is rather keen, and, while no radical changes are quoted, prices show weakish tendency.

Oils and Turpentine.

Generally steady markets, with rather better volume of business in some lines of goods is to be reported. Along with this is a hardening tendency to values in some instances, making, upon the whole, a condition of affairs quite as encouraging as could be expected at this season of the year. Linseed Oil stands out prominently in point of firmness in value and Cotton Seed Oils figure as the weak spot. However, the movement in values has generally been within narrow range.

Linseed Oil.—Crushers have advanced their prices to 47¢ for Raw and 50¢ for Boiled Oil, owing to higher cost of raw material. Only ordinary jobbing sales have been made at the advance, but competition is remarkably tame, indicating that crushers are working together with less friction than usual.

Cotton Seed Oils.—Under the influence of continued heavy receipts, and consequent accumulation of supply here, prices have remained unsettled and weak. There has been quite a good business, but not enough to exert much force against the weight of excessive supplies here and rather unfavorable reports from foreign markets. Sales have been made at 27¢ @ 28¢ for prime Crude, 33¢ @ 34¢ for prime Summer Yellow, and corresponding prices for other varieties.

Lard Oil.—Pressers are turning out little stock beyond what may be needed to fill orders. The latter are of good volume for the season, and prices are well maintained on both city and out of town brands.

Fish Oils.—Crude product generally has been quiet, home consumers seeming to need little, while exporters are without orders of any volume. Prices, however, are held quite firmly. Pressed and bleached stock has met with about the usual jobbing sale, chiefly at old prices.

Spirits Turpentine.—Prices have fluctuated within very narrow range, and business has been on a rather small scale. The demand has shown no radical change as compared with that of the preceding two or three weeks. Last sales were at 29¢ for regular and 29½¢ for machine barrels.

A Cut Nail Pencil.

Cross Pen Company, 168 Devonshire street, Boston, have just brought out a regular propelling lead pencil, as shown in the accompanying cut. This is made in exact imitation of a 10d cut nail, and is designed for pocket use. The com-

pany are known to the trade as manufacturers of nickel pencils made in imitation of wire nails, stove and carriage bolts, screws, &c. The point is made that the cut nail pencil is especially adapted for advertising purposes, as the sides, being flat, admit of stamping in good sized plain letters any name, business or address. The manufacturers are prepared to make quotations on this novelty for advertising purposes for the new year.

The Delmonico Meat Tenderer.

Pullman Sash Balance Company, Rochester, N. Y., are putting the meat tenderer shown herewith upon the mar-

ket. The knives are described as made from tool steel, ground to a chisel point. The plunger, as shown in Fig. 2, is taken out by removing the pin

and one malleable iron washer. The ring is lined with leather riveted in with three split rivets. The ring is riveted to the plate with a $\frac{1}{2}$ -inch Norway rivet and the center to the yoke

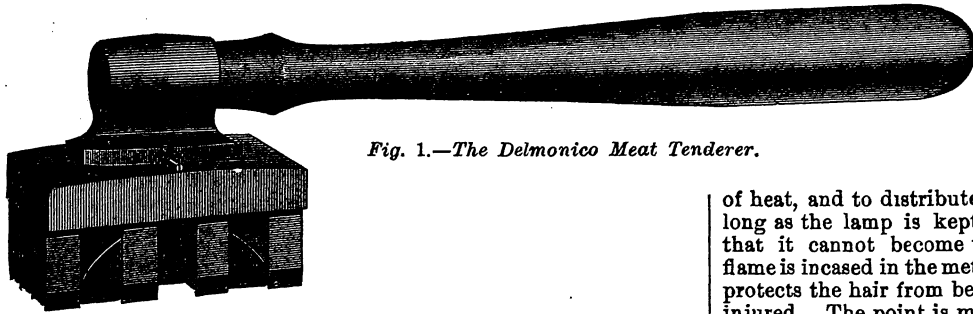


Fig. 1.—The Delmonico Meat Tenderer.

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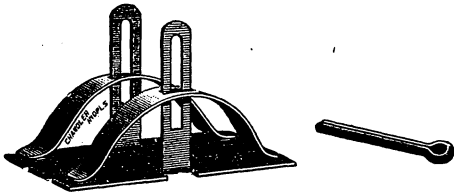


Fig. 2.—Plunger and Key.

when cleaning and washing the tenderer. The parts, it is stated, are all interchangeable and are easily kept clean. The tenderer is furnished both in tinned and japanned.

Wrought Steel Neck Yoke Center.

S. C. Johnson, Racine, Wis., is introducing a neck yoke center, as shown

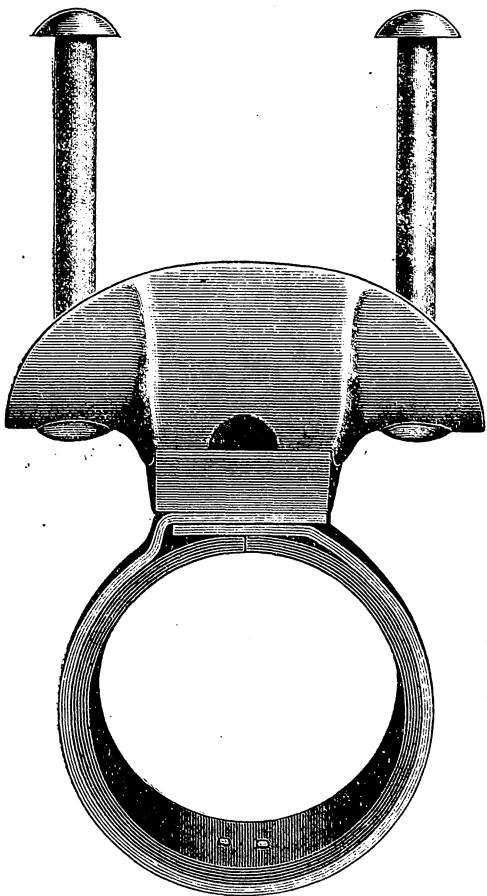


Fig. 1.—Wrought Steel Neck Yoke Center.

in Fig. 1. The center is made entirely of wrought sheet steel, with the exception of the rivets, which are Norway iron,

with two $\frac{1}{2}$ -inch rivets. The center, it is stated, is strong, neat and durable. The centers are furnished separate from



Fig. 2.—Yoke and Center Complete.

yokes, or yokes can be ordered complete, as in Fig. 2, in any style desired.

Unique Self Heating Hair Curler.

The hair curler shown in the cuts herewith given is being introduced by the Unique Novelty Company, 99-103

of heat, and to distribute it equally so long as the lamp is kept burning, and that it cannot become too hot, as the flame is incased in the metal bulb, which protects the hair from being burned or injured. The point is made that lamp, stand and curler being all in one piece, require no more room than an ordinary curling iron, and that by lighting the

wick the curler is ready for use. The manufacturers remark that the curler is a time and labor saver at home, a great convenience at evening parties, and an addition to the traveling toilet; also that, owing to an almost universal use of the electric light in hotels, boats, on cars, &c., it has become nearly impossible to properly curl the hair while traveling. The curler is furnished nickel, silver or gold plated.

The handsome gift to Cornell University at Ithaca, N. Y., by Hiram W. Sibley of Rochester, N. Y., is rapidly nearing completion. It is of gray sandstone and four stories high, and is expected to be ready for the use of the

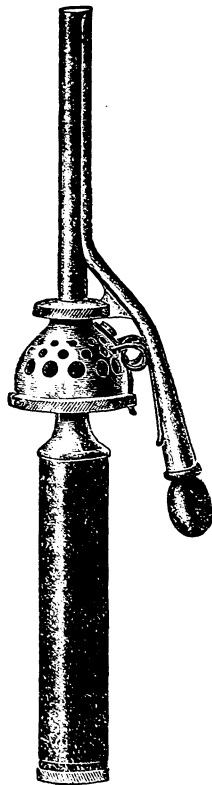


Fig. 1.—Unique Self Heating Hair Curler.

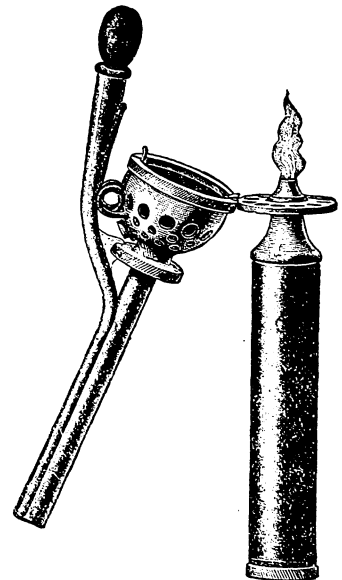


Fig. 2.—Curler Open, Showing Flame.

Abbott street, Detroit, Mich. The handle is of hard rubber, inside of which is a metal tube. The tube is filled with cotton, which a thumb screw at lower end of the tube permits being saturated with alcohol. As shown in Fig. 2, the curler opens by means of a hinge at the metal bulb, at which end of the handle is a wick connected with

students by spring. The school of marine engineering will occupy the whole second floor, with the necessary drawing apartments. The top floor will be given up to the use of second and third year students for study in machine drafting, each man being supplied with separate tools and table. The building is a model of its kind.

A New Cutlery Box.

The American Cutlery Company of Chicago have just brought out a new and attractive box, intended to hold a half dozen each of silver plated knives and forks. The new box is made of a

Kingsland Wood Rim.

The accompanying illustration shows a section of a wood rim for bicycles, being offered by the Bicycle Wood Rim Company, Kingsland, N. J. The rim is described as being made of a

for spokes, and furnished with metal washers to protect nipples, if the number of holes are specified on order. The manufacturers emphasize the fact that the wood rim is not a racing fad, but that it is the result of three years' experience on the road; that it will stand

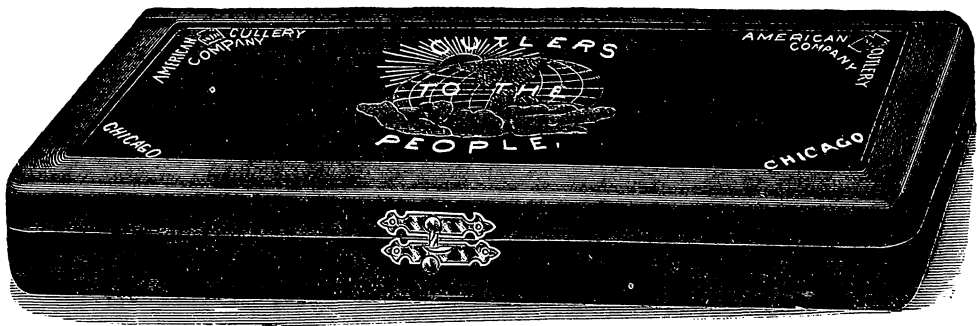


Fig. 1.—Cutlery Box.

material over which they have control, and is called marbled. It is of such a character that the cover is molded in one piece, with no joints, and the body of the box in another piece. The illustrations show how well

single piece of white ash, bent and joined by a lap joint covering 4 to 5 inches; the joint is then wound with heavy linen. So confident are the makers of the strength of the joint, that the hole for the valve stem is put right

up under all conditions where a steel rim will go, and will ride faster and with more ease to the rider. An illustrated catalogue illustrates wood rims, describes the process of manufacture and explains the advantages of wood

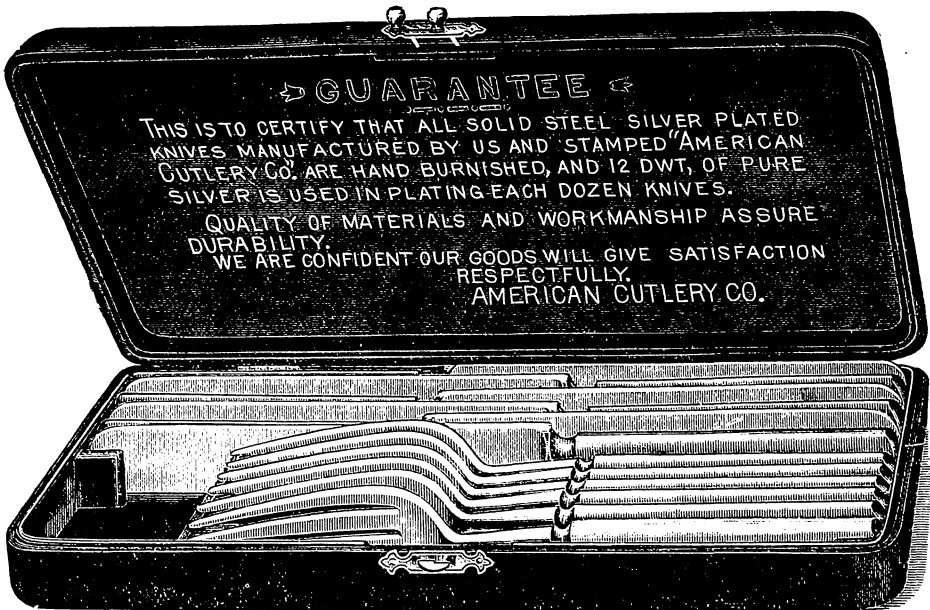
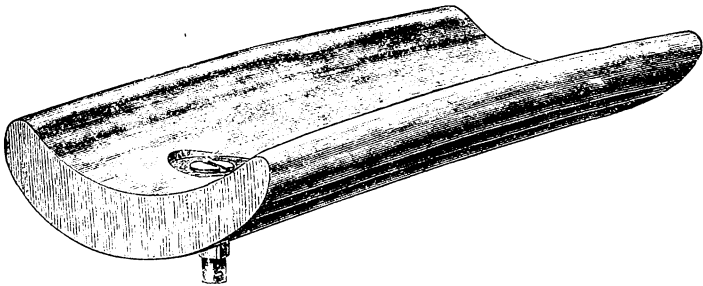


Fig. 2.—Arrangement of Cutlery in Box.

the material lends itself to an attractive shape. On the inside of the cover is the company's guarantee in raised letters, while upon the outside the world

through the joint, as the strongest part of the rim. The rims, it is stated, are bent naked, without protecting steel covering bands, so that defective stock

rims over steel rims. The rims are made of a single piece of white ash, and the statement is made that white ash has 12½ times the resiliency of steel.



Kingsland Wood Rim.

occupies the center, surrounded by the company's name, &c.

A committee has been formed for the promotion of an international exhibition on the largest scale to be held in London in 1896 or 1897.

is broken when it is in process of bending. A sample rim at hand weighs scant 16 ounces. The company will replace with a new rim any that prove defective in stock or workmanship, or that shall fail at the joint, within one year. The rims are made any diameter or width, and will be bored with holes

THE NUBIAN IRON ENAMEL COMPANY of Cragin, Ill., report their sales of Nubian in small packages almost up to former years, notwithstanding the dullness in general trade. As an evidence of the manner in which tariff agitation disturbs trade in almost unexpected quarters, the company state that they have many customers among manufacturers whose products are affected by the provisions of the Wilson bill, and who will not buy until some definite decision is made by Congress. One customer, for example, is a manufacturer of cotton ties, who uses from eight to ten carloads of Nubian Enamel annually. As cotton ties are scheduled to go on the free list, it is not remarkable that this customer is not buying materials. Others are not hit quite so hard, but prefer to wait to see exactly where they will stand, and meantime the sales of Nubian as well as other materials must suffer.

The Gardner Observation Door Fast.

An illustration is given in Fig. 1 of the new Gardner observation door fast, which is designed to take the place of the time honored chain. It is composed of two parts—the door fast, which is attached to the jamb, and the thumb bolt, which is inserted in the door. The door fast is shown on a larger scale in Fig. 2. It consists of a plate, to which a slotted piece of metal is strongly riveted at the top. The plate is set into the door jamb, so that it is not in the way. In Fig. 3 is shown the thumb bolt also, on a large scale. It has a round body, so that a $\frac{1}{8}$ -inch bit makes a perfect socket for it. The end of the bolt is finished with a knob. The action of the door fast, as will be seen, is very simple. When the door is

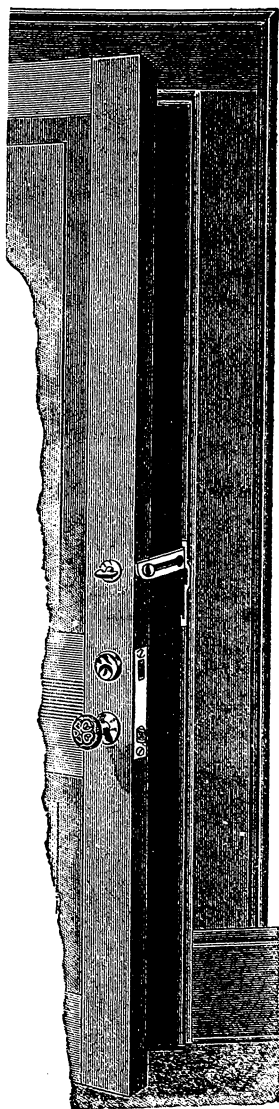


Fig. 1.—The Gardner Observation Door Fast.

closed a turn of the thumb bolt places the knobbed end into the top of the slot on the fast. On opening the door the end of the bolt pulls the arm of the fast up to a horizontal position, but the door can only be opened to the length of the slotted piece. An intruder cannot loosen it even if he is able to put his hand in and turn the thumb bolt, because the knob on the end will not slip out of the slot except at its widest part, which is only in position when the door is shut. The cut of the door fast is not perfectly accurate. The

slotted piece is hung so that it will swing to either side of the plate, so that it can be used on either a right or left hand door. Its weight will always make it hang straight. The point is made that, the chain being avoided, there is nothing to mar the door wood

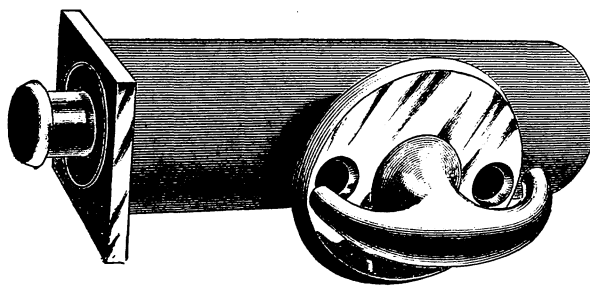


Fig. 3.—Thumb Bolt.

work; also that the device is always in place, ready for instant use, and that it can be applied to any door.

The fast is made of cast bronze or brass in all finishes, and is also stamped from steel or brass and plated in all finishes. It is manufactured by G. C. Gardner, Gardner Sash Balance Company, First National Bank Building, Chicago.

Moore's Storm Window Fastener.

The accompanying cut represents a storm window fastener put on the market by True & Blanchard, Newport, Vt. It consists of a malleable iron casting with screw slots above and below the offset. The fastener is attached from

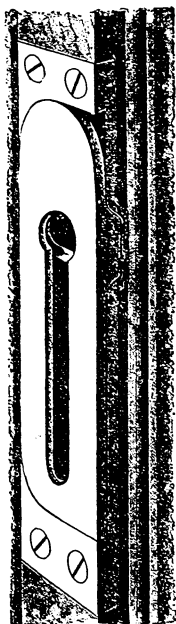
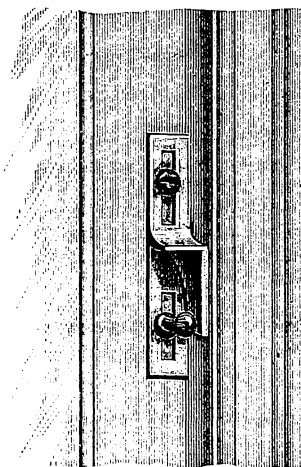


Fig. 2.—The Door Fast.

the inside to the storm window sash by means of two screws through the slots, so that the casting may be slid up and down. The fastener is pushed up as far as it will go and a screw put in the casing at the lower end of the off set, after which the fastener is driven down on to the casing screw, thus holding the sash tightly in place. The manufacturers state that the window is held in this way tighter than with screws driven through it from the outside; that the window can be put on and taken off in an instant without the use of ladders

and from the inside; that the castings being malleable will stand all the driving necessary to draw as tightly as desired; that the fastener is as desirable for windows that set in flush as for those that set on the outside, and that after the fasteners have been attached

to the storm window no screw driver is required to fasten the window in place in subsequent years. The New England



Moore's Storm Window Fastener.

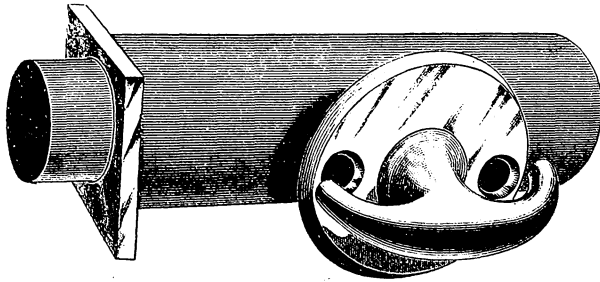
trade will be supplied through Bigelow & Dowse of Boston.

The Ideal Mfg. Company, New Haven, Conn., have added to their line adjustable molds .32-40, .38-55M and .40S. Molds for .32-40 rifles make bullets in eight different weights, ranging from 105 to 210 grains. These bullets have the standard form forward of the grooves, so that reloading tools for 32-40 Winchester, Marlin or Stevens may seat the bullets properly. The .38-55M molds (.875 diameter) make nine bullets, from 158 to 332 grains, in form the same as the standard .38-55, so as to be seated in shells with any regular tool for standard cartridge, as .38-55 Marlin, Winchester or Stevens; also .38 56 and .38-90 Winchester. The .40S Sharps or Remington mold (.403 diameter) makes eight bullets, from 188 to 333 grains. These bullets are especially designed for single shot rifles, as Sharps, Remington, Ballard, Winchester, Stevens and Maynard, using .40-50, .40-70, .40-90 bottle neck, and .40-50, .40-70, .40 90 Sharps straight and Ballard shells.

The New York Board of Underwriters at a recent meeting adopted a resolution that hereafter they will decline to issue approval for electrical equipments for advertising purposes in show windows and mercantile establishments where motors are used or where electric currents are shunted or broken on different currents for display purposes.

The Gardner Door Bolt.

An illustration is given herewith of the new Gardner door bolt. This bolt is of the type requiring merely a hole bored in the door by a bit, the shell being round. The face, however, is square, so that the bolt will be fitted in place in proper position to receive the shank of the knob. The case is made of cast iron, and the bolt of brass. Its interior construction is very simple. The square shank fits in the corner of a V-shaped cam, held in position by a flat spring, so that the bolt can easily be thrown forward or backward, and is



The Gardner Door Bolt.

then held in position as thrown. This bolt is made in one size only, $\frac{1}{8}$ inch diameter of shell, but in all styles of hardware finish. It is manufactured by G. C. Gardner, Gardner Sash Balance Company, First National Bank Building, Chicago.

Pullman Wrought Steel Spring Hinges.

The accompanying cuts represent spring hinges being introduced by the Pullman Sash Balance Company, Rochester, N. Y., for whom Jas. H. Robley, 142 Chambers street, New York, is agent. The Lion, or No. 1 hinge, Fig. 1, is made, it is stated, of the finest grade of wrought steel, and that the placing of two screw holes at the nearest point to the hinge part insures

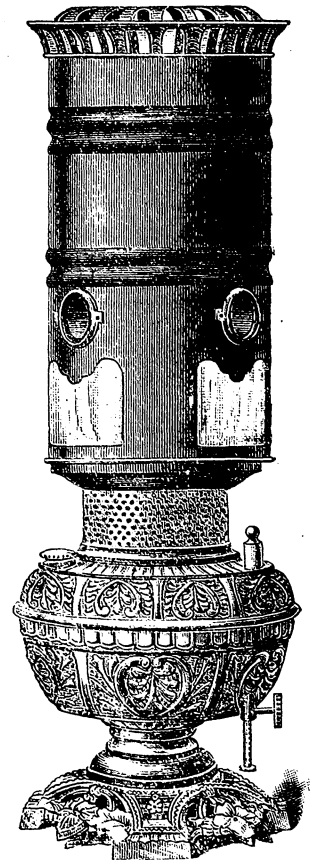
the joints together, which is referred to as overcoming an objection sometimes found with spring hinges. It is remarked that the spring has 21 volutes, and that the coil spring is made of the best grade of steel spring wire. The hinge is made in one size only, $3 \times 2\frac{1}{2}$, japanned, for either right or left hand doors. Fig. 2 represents the Conqueror, or No. 2 hinge, which is made of the same grade of material, and the joints are held together with a loose pin lug, the same as the No. 1 hinge. The manufacturers state that the strain on the coil of this hinge decreases in opening and increases in closing the door, and that the tension working au-

tomatically prevents any wear on the coil spring. This hinge is made in one size, $3 \times 2\frac{1}{2}$, finished in japan.

Banner Oil Lamp Stove.

The Plume & Atwood Mfg. Company, 18 Murray street, New York, are introducing the oil lamp stove herewith illustrated. The fount and base of the lamp are nickel plated. The body of the drum is made of Russia iron, with round openings arranged to allow a continuous flow of cold air to be drawn into the flame, there to be heated and to be thrown off, largely increasing the heating capacity of the stove. The entire top lifts off from the fount for lighting, cleaning or trimming. The draft is regulated by an inside drum and side

manufacturers state that the fount has a capacity of about 1 gallon of oil, that it burns from 10 to 12 hours, without odor, heating comfortably at a nominal cost a room 15 feet square. The stove



Banner Oil Lamp Stove.

is referred to as especially valuable where only temporary heat is required, as in bedrooms, bathrooms, &c.

It is probable that a special session of the Michigan Legislature will be called to consider measures of relief for the

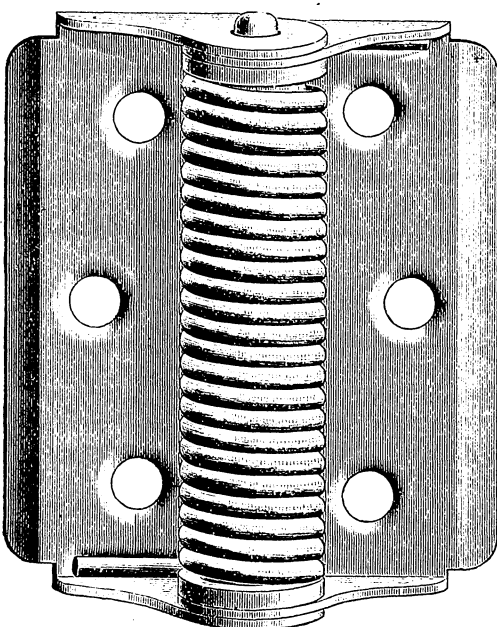


Fig. 1.—Lion Steel Spring Hinge No. 1.

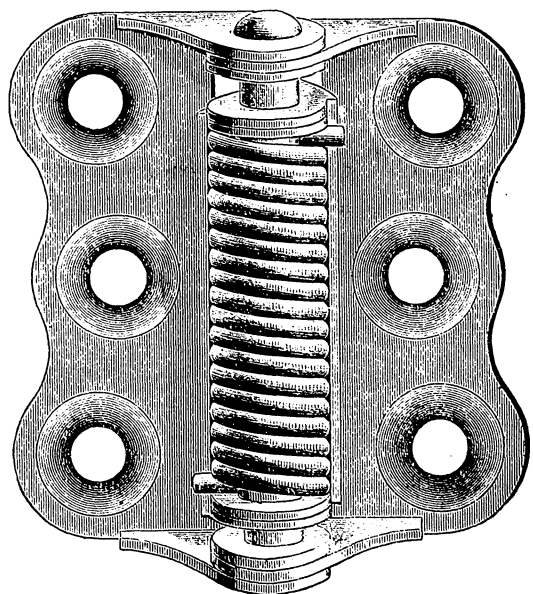


Fig. 2.—Conqueror Steel Spring Hinge No. 2.

strength where it is most needed and prevents the hinge working loose. To obviate the binding or sticking of the joints a loose pin lug is used for holding

air chamber, so that no chimney is required. The flame is regulated by their Banner screw wick movement, which allows of nicety of adjustment. The

unemployed and destitute miners of the State. It is estimated that over \$150,000 will be needed to tide them over the winter.

DECEMBER 13, 1893.

The character @ is used to indicate a range of price; thus discount 50&10@50&10&5 % signifies that the goods in question are sold at prices ranging from discount 50 and 10 % to discount 50 and 10 and 5 %.

Red, case lots... gr 67¢; small lots, 72
White, case lots... gr 50¢; small lots, 52

Chalk Lines—See Lines.**Checks, Door—****Chisels—****Socket Framing and Firmer****Mix****New Haven****Ohio Tool Co.****P. S. & W.****Wetherby****Buck Bros.****Douglass****Merrill****L. & J. White****Tanged and Miscellaneous****Buck Bros.****Butchers****Cold Chisels, fair quality****Spear & Jacksons****Tanged Firmer****Chucks—****Beach Pat.****Danbury****Graham Patent****Morse's Adjustable, each****Syracuse, Balz Pat.****Skinner's Patent Chucks****Combination Lathe Chucks****Drill Chucks****Independent Lathe Chucks****Universal Lathe Chucks****Union Mfg. Co.****Combination****Independent****Universal****Victor****Churns—****McDonald Star Barrel Churn, each****Tiffin Union, each****Clamps—****Adjustable, Cincinnati****Adjustable, Hammer****Adjustable, Stearns****Barnes Machinists' Clamps****Cabinet, Sargent's****Carpenter's, Cincinnati****Carriage Makers, P. S. & W. Co.****Carriage Makers, Sargent's****Eberhard Mfg. Co.****R. I. Tool Co.'s Wrought Iron****Saw Clamps, see Vises, Saw Filers****Stearns' Adjustable Cabinet and Cor-****Warner's****Cleavers, Butchers****Beatty's****Bradley's****Foster Bros.****New Haven Edge Tool Co.'s****P. S. & W.****Schulte, Lohoff & Co.****L. & J. White****Clips****Baker & A. Clips****Norway, Axle, & 16****Norway Spring Bar Clips, 5-16****2d grade Norway Axle, 1/2 & 5-16****Steel Felloe Clips****Superior Axle Clips****Wrought Iron Felloe Clips****Cloth and Netting, Wire****Cockeyes****Cocks Brass—****Hardware list (Globe, Kerosene, Lever****Bibbs, Racking, &c.)****Coffee Mills—See Mills, Coffee.****Collars, Dog****Brass, Pope & Steven's list.****Chapman Mfg. Company, new list.****Embossed, Gilt, Pope & Steven's list.****Leather, Pope & Steven's list.****Medford Fancy Goods Co.****Combs Curry—****American Curry Comb Co.****Fitch's****Kohler's Humane****Kohler's Magic Oscillating****Rubber, per doz.****Compasses, Dividers &c.****Compasses, Calipers, Dividers****Bemis & Call Co.'s****Dividers****Calipers, Double****Calipers, Patent Inside****Calipers, Inside or Outside****Calipers, Wing****Compasses****Excelsior****Starrett's****Combination Dividers****Lock Calipers and Dividers****Spring Calipers and Dividers****Stevens & Co.'s****Coolers, Water—****S. S. & Co.: 2-gal., \$2.00; 3-gal., \$2.50;****4-gal., \$2.75; 6-gal., \$3.40 each.****Coopers Tools—****See Tools, Coopers.****Cord Sash—****Braided, Crown, Drab and Fancy, 1/2****Common****Common Russia Sash****Egyptian, India Hemp, Braided****India Cable, Drab Sash****Massachusetts, White****Ossawa Mills—****Braided, Giant, Drab and Fancy, 1/2****Braided, Giant, White, 1/2****Patent, good quality****Patent Russia Sash****Braided, Drab Cotton****Braided, India Hemp****Braided, Linen****Braided, White Cotton****Semper Idem, Braided, White****Silver Lake****A quality, Drab, 55¢****A quality, White, 50¢****B quality, Drab, 35¢****B quality, White, 30¢****Sylvan Spring, Extra Braided, Drab****Sylvan Spring, Extra Braided, White****Tate's Solid Braided****Economy Drab****Economy, White****Hercules, Drab****Hercules, White****White Cotton Braided, fair****Wire Picture—****Braided or Twisted****Corkscrews—See Screws, Cork.****Corn Knives and Cutters****See Knives, Corn.****Crackers, Nut—****Acme****Jannaped, 1/2 gro., \$30****Nickel Plated, 1/2 gro., \$30****Blake's Pattern, 1/2 doz., \$2.00****Table (H. & B. Mfg. Co.)****Turner & Seymour Mfg. Co.****Cradles—****Grain****White Crayons, 1/2 gross****D. M. Steward Mfg. Co.****Metal Workers', 1/2 gross, \$2.50****Railroad, 1/2 gross, 2.00****Rolling Mill, 1/2 gross, 2.50****Soapstone Pencils, 1/2 gross, 1.50****See also Chalk.****Creamery Pails—See Pails,****Creamery****Crow Bars—See Bars, Crow.****Curry Combs—****See Combs, Curry.****Curtain Pins—****See Pins, Curtain.****Cutters—****Meat—****American****Nos. 1, 2, 3, 4, 5****Each, \$5 \$7 \$10 \$25 \$50 \$80****Enterprise****Nos. 10 12 22 32 42****Each, \$3 \$2.50 \$4 \$6 \$15****Dixon's, 1 doz.****Nos. 1 2 3 4 5****Draw Cut, each:****Nos. 5 7 8 10 12 15 20 25****Hale's, 1 doz.****Nos. 11 12****Home No. 1, 1 doz., \$28.00****Little Giant, 1 doz., \$40.00****Nos. 305 310 312 320 322****Miles' Challenge, 1 doz., \$45.00****Nos. 2 3 4 5****Triumph No. 505, 1 doz., \$21.00****Woodruff's, 1 doz., \$40.00****Nos. 100 150****Beef Shavers (Enterprise)****Chadborn's Smoked Beef Cutter, 1 doz., \$68.00****Slaw and Kraut—****Tucker & Dorsey Mfg. Co.****Kraut Cutters****Slaw Cutters, 1 Knife, 1/2 gross, \$21.00****Slaw Cutters, 2 Knife, 1/2 gross, 30.00****Tobacco****Acme****Alcon****Champion****Nashua Lock Co.'s, 1 doz., \$18.00****Sargent's, 1 doz., \$24.00****Wilson's****Washer—****Appleton's, 1 doz., \$16.00****Bonney's, 1 doz., \$20.00****Cincinnati, 1 doz., \$25.00****Johnson's, 1 doz., \$11.00****Penny's, 1 doz., \$14.00****Smith's Pat., 1 doz., \$12.00****Diggers, Post Hole, &c.—****Cronk's Post Bars, 1 doz., \$80.00****Eureka Diggers, 1 doz., \$12.00****Fletcher Post Hole Augers, 1 doz., \$36.00****Gem, Improved, 1 doz., \$9.00****Gibbs' Columbia, 1 doz., \$13.50****Gibbs' Imperial, 1 doz., \$7.50****Gibbs' National, 1 doz., \$12.00****Gibbs' Post Hole Digger, 1 doz., \$15.00****Kohler's Hercules, 1 doz., \$14.00****Kohler's Invincible, 1 doz., \$12.00****Kohler's Little Giant, 1 doz., \$18.00****Kohler's New Champion, 1 doz., \$25.00****Samson, 1 doz., \$34.00****Schneider, 1 doz., \$18.00****Shimer's Hollow Handle, 1 doz., \$24.00****Vaughan's Post Hole Auger, 1 doz., \$9.50****Dividers—See Compasses.****Dog Collars—See Collars, Dog.****Door Checks—****See Checks, Door.****Door Springs—****See Springs, Door.****Drawers.****Money, 1 doz., \$18.00****Wadell's Improved, 1 doz., \$15.00****Drawing Knives—****See Knives, Drawing.****Drills and Drill Stocks—****Blacksmiths', each \$1.75****Blacksmiths' Self-Feeding, each \$7.50****Automatic Boring Tools, \$1.75 to \$1.85****Breast, Bartholomew's, each \$2.50****Breast, Millers Falls, each \$3.00****Breast, Wilson's, each \$3.00****Chicopee Automatic Drill, 20¢ to 25¢****Goodell Automatic Drills, 40¢ to 50¢****Ratchet, Curtis & Curtis, 30¢****Ratchet, Ingersoll's, 25¢****Ratchet, Merrill's, 20¢ to 25¢****Ratchet, Moore's Triple Action, 25¢ to 30¢****Ratchet, Parker's, 20¢ to 25¢****Ratchet, Weston's, 20¢ to 25¢****Ratchet, Whitney's, 20¢ to 25¢****Whitneys Hand Drill, Plain, \$11.00;****Adjustable, \$12.00.****Twist Drills—****Cleveland****Diamond V. & B.****Graham's Pat. Groove Shank****Morse****New Process****Standard****Syracuse (Metal list)****Drill Bits or Bit Stock****Drills—See Augers and Bits.****Drill Chucks—See Chucks.****Dripping Pans—****See Pans, Dripping.****Drivers, Screw—****Allard's Spiral, new list.****Brace Screw Drivers****Buck Bros.****Buck Bros.' Screw Driver Bits****Clark's Pat.****Cincinnati****Champion****Daston's****Douglass Mfg. Co.****Ellrich's Socket and Ratchet****Fray's Hol. H. die Seta. No. 3, \$12.00, 45¢****Gay & Parsons****Goodell's Automatic****Knapp & Cowles****No. 1**

Hay and Straw—

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Pullers Nail-

Soranton..... doz., \$18.00, 38¢
 Giant, No. 1..... doz., \$18.00, 10¢
 Giant, No. 2..... doz., \$15.00, 10¢
 Pelican..... doz., \$9.00, 25¢
 Eclipse..... doz., \$24.00, 25¢
 Economy..... doz., \$6.00

Pulleys-

Hot House, Awning, &c..... 60¢@70¢
 Japanned Screw..... 60¢@10¢
 Brass Screw..... 70¢
 Japanned Slide..... 60¢@10¢
 Moore's Side, Anti Friction..... 50¢
 Moore's Ceiling or End, Anti Friction..... 40¢
 Moore's Dumb Waiter, Anti Friction..... 60¢
 Moore's Electric Light..... 55¢
 Japanned Clothes Line..... 60¢@10¢
 Hay Fork, Solid Eye, 24" Swivel..... \$4.50
 Hay Fork, 50" 50¢@10¢
 Hay Fork, "Anti Friction," 5 in. solid..... \$5.70
 Hay Fork, "F" Common and Patent..... 50¢
 Hay Fork, Tarbo, Pat. Iron..... 20¢
 Hay Fork, Reed's Self Lubricating..... 60¢
 Hay Fork, Moore's Anti Friction 5 in. Wheel, doz., \$12.00..... 40¢
 Shade Rack..... 45¢
 Tackle Blocks-See Blocks.
 Shepard's Niagara, No. 25, doz 23¢ net
 Sash (Auger Mortise)..... 60¢
 Common Sense..... 60¢
 Empire..... 60¢
 Ideal, Nos. 2, 4, 10 & 15, doz less 1¢
 Acme..... doz net.
 Star.....
 On bbl. lots extra 5¢.
 Ideal, Nos. 25 and 55..... doz 22¢ net.

Pumps-

Clifton, Best Makers..... 60¢@80¢10¢
 Pitcher Spout, Best Makers..... 87¢@70¢
 Pitcher Spout, Cheaper G'ds..... 75¢@75¢10¢

Punches-

Saddler's or Drive, good..... doz., 60¢@95¢
 Bemis & Call Co.'s Cast Steel Drive..... 50¢@55¢
 Bemis & Call Co.'s Spring Steel Socket..... 50¢
 Spring, good quality..... doz., \$2.50@2.80
 Spring, Leach's Pat..... 40¢
 Bemis & Call Co.'s Spring..... 60¢@55¢
 Bemis & Call Co.'s Check..... 55¢
 Solid Timmers', P., S. & W. Co., doz..... \$1.44
 Timmers' Hollow Punches, P., S. & W. Co..... 20¢@25¢
 Rice Hand Punches..... 15¢
 Avery's Revolving..... 40¢
 Avery's Sawet and Punch-See Sawsets
 Niagara Hollow Punches..... 20¢@25¢
 Niagara Solid Punches..... 55¢

Rail-

Sliding Door, Wrt Brass..... doz., 85¢, 40¢
 Sliding Door, Battered Wrt Iron..... ft., 7¢
 Sliding Door, Iron, Painted..... ft., 4¢, 10¢
 Barn Door, Light..... 1/2 doz., 2.50 3.10, 40¢
 Per 100 feet..... \$2.00 2.50 3.10, 10¢
 B. D. for N. E. Hangers.....
 Small, Med. Large.....
 Per 100 feet..... \$3.15 2.70 3.25 Net
 Victor Track Rail, 7 1/2 ft. foot..... 50¢@25¢
 Carrier, double braced, Steel Rail, 4 ft. foot..... 34¢@4¢
 Lundy Parlor Door, Planed Edge, ft. 7¢
 Moore's Steel Rail..... 25¢@10¢
 Moody Steel Rail ft., 5¢..... 45¢

Rakes-

Cast Steel, Association G'ds, 70¢@70¢5¢2¢
 Cast Steel, outside G'ds, 70¢@70¢5¢2¢
 Malleable..... 70¢@70¢5¢
 Gibbs' Lawn Rake..... doz., \$4.90
 Gibbs' Canton Lawn Rake..... doz., \$3.75
 Gibbs' Acme Lawn Rake..... doz., \$4.75
 Gibbs' Favorite Lawn Rake..... doz., \$3.90
 Gibbs' Crown Lawn Rake, No. 1..... doz., \$4.90; No. 2, 3, 40¢
 Oneida Lawn Rake..... doz., \$3.00
 Fort Madison Prize Bow Brace and Peerless..... 65¢
 Fort Madison Steel Tooth Lawn Rake, \$3.00..... 25¢

Razors-

J. R. Torrey Razor Co..... Net prices
 Wostenholme and Butcher, \$10 to 25¢..... 10¢
 Jordan's AAAA, new list..... Net prices
 Jordan's AA Fairful, new list, Net prices
 Galvanic..... doz., \$15.00
 Electric Cutlery Co..... Net prices
 Campbell Cutlery Co..... 60¢

Razor Straps-

See Straps, Razor.

Registers-

Moore's Japanned..... 75¢
 Moore's Electroplated..... 75¢
 Moore's Bronze Finishes..... 70¢
 Moore's Solid Bronze..... 65¢
 Moore's Stove Pipe..... 35¢

Rings and Rings-

Bull Rings-
 Union Nut Co..... 55¢
 Sargent's..... 75¢@10¢
 Hotchkiss' low list..... 30¢
 Humason, Beckley & Co.'s..... 70¢@10¢
 Peck, Stow & W. Co.'s, 50¢@10¢@10¢10¢
 Ellrich Hd. Co., White Metal, low list..... 50¢@50¢10¢

Hog-

Top of the Hill Rings..... doz \$2.00
 Top of the Hill Rings..... doz \$1.25
 Hill's Improved Rings..... doz \$1.25
 Hill's Old Style Rings..... doz \$1.12
 Hill's Tongs..... doz \$3.00
 Hill's Rings..... doz bxs \$1.50
 Perfect Rings..... doz bxs \$1.50
 Perfect Rings..... doz \$2.15@2.25
 Blair's Hog Rings..... doz \$3.00
 Blair's Hog Rings..... doz \$2.00
 Champion Rings, Double..... doz \$2.25
 Brown's Rings..... doz \$2.00
 Brown's Rings..... doz \$1.15@1.25
 Electric Hog Rings..... doz boxes \$1.50
 Electric Hog Rings..... doz \$2.00
 Major Rings..... doz \$2.00
 Major Rings..... doz \$2.00

Rivets and Burrs-

Norway Iron, list Nov. 17, '87..... 60¢@10¢
 Second quality..... 70¢
 Copper..... 60¢@60¢10¢
 Copper Iron, Betina Brand..... 60¢@5¢

Rivet Sets-See Sets.**Roasting and Baking**

Pans-See Pans, Roasting and Baking.

Rods-

Stair, Brass..... 25¢@30¢
 Stair, Black Walnut..... doz 40¢

Rollers-

Barn Door, Sargent's list..... 60¢@10¢10¢
 Acme Moore's Anti Friction..... 55¢
 Union Barn Door Roller..... 70¢
 Moore's Barn Door Stay..... 50¢
 Thompson Mfg. Co.'s Lawn Rollers..... 30¢

Rope-The following prices are f.o.b.

New York or factory, and are shaded 1/4¢ on large lots; terms, 1 1/2 % for cash.
 Manila, 7-16 in. diam. and larger..... 8 @ 8 1/4¢
 Manila..... 8 @ 8 1/4¢
 Manila, 1/4 and 5-16 in..... 9 @ 9 1/4¢
 Manila, Hay Rope, Med'm..... 7 1/2 @ 7 1/4¢
 Sisal, 7-16 in. and larger..... 5 1/2 @ 5 1/4¢
 Sisal..... 7 1/2 @ 7 1/4¢
 Sisal, 1/4 and 5-16 in..... 6 1/2 @ 6 1/4¢
 Sisal, Hay Rope..... 5 1/2 @ 5 1/4¢
 Sisal, Tarred Rope..... 5 1/2 @ 5 1/4¢
 Sisal, Medium Lath Yarn..... 5 1/2 @ 5 1/4¢
 New Zealand..... 5 1/2 @ 5 1/4¢
 New Zealand, 1/4 inch..... 5 1/2 @ 5 1/4¢
 New Zealand, 1/4 and 5-16 in..... 5 1/2 @ 5 1/4¢
 New Zealand, Hay Rope..... 5 1/2 @ 5 1/4¢
 New Zealand, Tar'd Rope..... 5 1/2 @ 5 1/4¢
 Cotton Rope..... 13 @ 13 1/2¢
 Jute Rope..... 13 @ 13 1/2¢

Wire-

List February, 1892. All kinds..... 45¢

Rules-

Boxwood..... 80¢@10¢10¢80¢10¢10¢10¢
 Ivory..... 60¢@10¢
 Starrett's Steel Rules and Straight Edges..... 25¢@10¢

Sad Irons-See Irons, Sad.**Sand and Emery Paper**

and Cloth-
 See Paper and Cloth.

Sash Cord-See Cord, Sash.**Sash Locks-See Locks, Sash.****Sash Weights-**

See Weights, Sash.

Sausage Stuffers or Fillers-See Stuffers or Fillers, Sausage.**Saws-**

Note-Extra 5¢@10¢ often given.

Diston's Circular..... 45¢@45¢5¢
 Diston's Cross Cut, list Jan. 1, '93, 40¢@10¢
 Diston's Hand..... 25¢
 Woodrugh & McFarlin..... 25¢@10¢
 Hand, Panel and Rip..... 25¢@10¢
 Wheeler, Madden & Clemson Mfg. Co..... 30¢@10¢
 Hand, Panel and Rip..... 25¢@10¢
 Cross Cuts, list Jan. 1, 1893..... 45¢@10¢
 Atkins' Circular..... 50¢@10¢
 Atkins' Cross Cuts, new list..... 40¢
 Atkins' Mulay, Mill and Drag..... 50¢@10¢
 Atkins' One-Man Saw..... 40¢
 Atkins' Wood Saws..... 40¢
 Hand, Panel and Rip..... 45¢@45¢5¢
 Peace Hand Panel and Rip..... 25¢@25¢5¢
 Peace Cross Cuts, list Jan. 1, '93..... 45¢@10¢
 Richardson's Circular and Mill..... 45¢@45¢5¢
 Richardson's X Cuts, list Jan. 1, '93, 45¢@10¢
 Richardson's Hand, &c..... 25¢@25¢5¢
 C. E. Jennings & Co..... 45¢@45¢5¢
 Simonds' Circular Saw..... 45¢@45¢5¢
 Simonds' Crescent Ground Cross Cut Saws..... 30¢
 Simonds' Gang, Mill, Mulay and Drag Saws..... 45¢@45¢5¢

Hack Saws-

Griffin's, complete..... 40¢@10¢50¢
 Griffin's Hack Saw Blades..... 40¢@10¢50¢
 Star Hack Saws and Blades..... 25¢
 Eureka and Crescent..... 25¢

Scroll-

Lester, complete, \$10.00..... 25¢
 Rogers, complete, \$4.00..... 25¢
 Barnes' Builders' and Cab Makers' \$15.25¢
 Barnes' Scroll Saw Blades..... 35¢

Saw Frames-

See Frames, Saw.

Saw Sets-See Sets, Saw.**Saw Tools-See Tools, Saw.****Scales-**

Hatch, Counter, No. 171, good quality..... \$18.00@19.00
 Hatch, Tea, No. 161..... \$9.50@9.70
 Union Platform, Plain..... \$2.10@2.20
 Union Platform, Striped..... \$2.10@2.20
 Chatillon's Grocers' Trip Scales..... 50¢
 Chatillon's Eureka..... 25¢
 Chatillon's Favorite..... 40¢
 Family Turnbills..... 30¢@30¢10¢
 Riehle Bros.' Platform..... 40¢

Scale Beams-

See Beams, Scale.

Scissors, Fluting-

45¢

Scrapers-

Adjustable Box Scraper (S. R. & L. Co.)..... \$8.00..... 30¢@10¢
 Box, 1 Handle..... doz \$2.00
 Box, 2 Handle..... doz \$3.00@4.00
 Denance Box and Ship..... 20¢@10¢
 Foot..... 50¢@10¢
 Ship, Common..... doz \$5.50
 Ship, R. I. Tool Co..... 10¢

Screen Window and Door

Frames-See Frames

Screw Drivers-

See Drivers, Screw

Screws-**Bench and Hand-**

Bench, Iron..... 55¢@10¢55¢10¢10¢
 Bench, Wood, Beach..... doz \$2.25
 Bench, Wood, Hickory..... 20¢@10¢
 Hand, Wood..... 25¢@10¢25¢10¢5¢
 Hand, Grand Rapids, list..... 35¢

Coach, Lag and Hand-Rail-

Lag, Blunt Point, list Jan. 1, 1890..... 80¢@10¢80¢25¢
 Coach and Lag, Gimlet Point, list Jan. 1, 1890..... 80¢@10¢80¢20¢
 Hand Rail, Sargent's..... 70¢@10¢
 Hand Rail, H. & B. Mfg. Co..... 70¢@10¢75¢
 Hand Rail, Am. Screw Co..... 75¢

Jack Screws-

Jack Screws, Millers Falls list, 50¢@50¢10¢
 Jack Screws, P. S. & W..... 35¢
 Jack Screws, Sargent..... 70¢
 Jack Screws, Stearns..... 40¢@40¢10¢

Cork-

Humason & Beckley Mfg. Co. 40¢@10¢50¢
 Williamson's..... 38¢@35¢45¢
 Williamson's Forged Wood..... doz., \$5.00; Rosewood, \$5.50..... 40¢
 Detroit Cork Screw Co..... 33¢@5¢

Machine-

Flat Head Iron..... 65¢
 Round Head Iron..... 60¢

Wood-

List January 1, 1891..... 70¢
 Flat Head Iron..... 65¢ Extra 10¢
 Flat Head Brass..... 65¢ 10¢ often given.
 Flat Head Bronze..... 70¢
 Round Head, Bronze..... 65¢
 Rogers' Drive Screws..... 82¢@5¢

Scroll Saws-See Saws, Scroll.**Scythes-**

Grain..... 40¢@5¢40¢10¢
 Grass..... 40¢@10¢50¢

Scythe Snaths-

See Snaths, Scythe.

Sets-

Alken's Sets, Avisa and Tools..... 60¢@60¢5¢
 No. 20, doz 10 Hds., \$12, 2, \$18;
 Fray's Adj. Tool Hds., No. 1, \$12, 2, \$18;
 3, \$12; 4, \$9..... 45¢
 Millers Falls Adj. Tool Hds., No. 1, \$12;
 No. 4, \$12; No. 5, \$18..... 25¢
 Benck's Combination Haft..... doz \$6.50
 Stanley's Excelsior..... No. 1, \$7.50; No. 2, \$4.00; No. 3, \$5.50..... 30¢@10¢
 Common Brad Sets, No. 42, \$10.50; No. 43, \$12.50..... 70¢@10¢5¢

Nail-

Square..... gr. \$4.00@4.25
 Round..... gr. \$3.25
 Buck Bros..... 27¢@5¢
 Cannon's Diamond Point..... gr. \$12, 50¢

Rivet-

Regular list..... 70¢

Saw-

Stillman's Genuine..... doz \$5.00@7.75, 40¢@5¢

Stillman's Pattern, Hand, doz \$3.25
 Cross cut, \$6.50..... 40¢@5¢10¢
 Common Lever..... doz \$2.00, 45¢@50¢
 Morrill's No. 1, \$15.00..... 40¢@20¢
 No. 11, \$16.00..... 40¢@20¢
 Nos. 3 and 4, Cross Cut, \$23.00..... 40¢@20¢
 No. 5, Mill, \$31.00..... 40¢@20¢
 No. 10, \$15.50..... 40¢@20¢
 Leach's No. 0, \$8.00; No. 1, \$12.00..... 40¢@20¢
 Ash's Imitation..... doz \$3.00@4.00
 Hammer, Hotchkiss..... \$5.50, 10¢
 Hammer, Bemis & Call Co.'s new Pat. 45¢
 Bemis & Call Spring Hammer..... 30¢@5¢
 Bemis & Call Co.'s Plate..... 20¢
 Bemis & Call Co.'s Cross Cut..... 30¢@5¢
 Alken's Genuine..... \$13.00, 60¢@10¢10¢
 Alken's Imitation..... doz \$3.00@3.25
 Hart's Pat. Lever..... 20¢
 Diston's Star..... 25¢
 Leopold..... 40¢@10¢50¢
 Atkin's Lever..... doz No. 1, \$8.00
 Atkin's Criterion..... doz No. 1, \$8.00
 Croissant (Keller), No. 1, \$15.00; No. 2, \$24.00..... 40¢@10¢50¢
 Ayer's Saw Set and Punch..... 50¢
 Kohler's Royal..... doz \$7.00
 Kohler's Giant Royal..... doz \$12.00
 Crescent..... doz \$3.00
 Lloyd's Acme..... doz \$15, 40¢@10¢
 Taintor Positive..... doz \$18, 50¢

Sharpeners, Knife-

Applewood Handles..... doz \$6.00, 40¢
 Rosewood or Cocobola..... doz \$9.00, 40¢

Shaves, Spoke-

Iron..... 45¢
 Wood..... 30¢
 Bailey's (Stanley R. & L. Co.)..... 40¢@10¢
 Stearns..... 30¢@10¢
 Cincinnati..... 25¢@10¢
 Goodell's..... doz \$9.00..... 25¢

Shears-

American (Cast) Iron..... 75¢@10¢75¢10¢5¢
 Seymour's Lamp Trimmers..... doz \$3.75
 Seymour's, list Dec. 1881..... 60¢@10¢@60¢10¢10¢5¢
 Heinisch's, list Dec. 1881..... 60¢@10¢@60¢10¢10¢5¢

Heinisch's Tailor's Shears-

First quality..... 80¢@80¢10¢
 Second quality..... 80¢@10¢80¢10¢10¢
 Acme Cast Shears..... 10¢@10¢
 Diamond Cast Shears..... 10¢
 Clipper..... 10¢@10¢
 Victor Cast Shears..... 75¢@10¢75¢10¢5¢
 Hot Bros. & Hulbert, Solid Forged Steel..... 40¢
 Cutlery Co., Solid Steel Forged Steel..... 40¢
 Davenport Cutlery Co..... 60¢@60¢10¢
 Clausen brand, Japanned..... 70¢
 Clausen brand, Nickel, same list..... 60¢
 Galvanic 3/4 to 9 in., doz \$1.00 1/2 inch Electric Cutlery Co..... 75¢
 Campbell Cutlery Co., Jap'd..... 75¢
 Nickel Plated..... 65¢

Timmers' Snips-

Wrt. Handles, Steel Blades..... 20¢@20¢10¢
 Niagara Snips and Shears..... 80¢@10¢
 Cast Handles, Laid with Steel..... 40¢

Pruning Shears and Hook

Diston's Combined Pruning Hook and Saw..... doz \$18.00, 20¢@10¢
 Diston's Pruning Hook, doz..... 20¢@10¢
 E. S. Lee & Co.'s Pruning Tools, 50¢@10¢70¢
 Pruning Shears, Henry's Pat. doz..... \$3.50@4.00
 Henry's Pruning Shears, doz..... \$4.25 @ \$4.50
 Wheeler, M. & C. Co., Combination, doz \$12.00
 Dunlap's Saw and Chisel, doz \$3.50, 30¢
 J. Mallinson & Co., No. 1, \$6.25; No. 2, \$7.25
 P. S. & W. Co..... 60¢
 Levin Pruner No. 1, \$15.00 doz 40¢@3¢
 Levin Pruner No. 2, \$21.00 doz 40¢@3¢

Timmers', &c.-

Shears and Snips (P. S. & W.)..... 20¢@25¢
 Snips, J. Mallinson & Co..... 33¢@5¢

Sheaves-

Sliding Door-
 M. W. Co., list July, 1888..... 50¢@10¢60¢5¢
 R. E., list Dec. 18, 1885..... 55¢@20¢
 Corbin's list..... 60¢@10¢2¢
 Patent Roller..... 60¢@10¢2¢
 Patent Roller, Hatfield's..... 75¢
 Russell's Anti Friction, list Dec. 18, 1885..... 60¢@2¢
 Moore's Anti Friction..... 50¢

Sliding Shutter-

R. E., list Dec. 18, 1885..... 60¢@10¢2¢
 Sargent's list..... 70¢
 Reading list..... 60¢@10¢10¢

Shells-

First quality 4, 8, 10 and 12 gauge..... 25¢@10¢2¢
 First quality Rival, Club and Climax brands, 14, 16 and 20 gauge (87.50 list)..... 20¢@10¢2¢
 Prize..... 40¢@2¢
 Star, Club, Rival and Climax Brands..... 33¢@10¢2¢
 Smokeless brand, 12, 10, 16 gauge..... 33¢@10¢2¢
 Trap brand, 12 and 10 gauge, 33¢@10¢2¢
 Selfbold's Comb. Shot Shells..... 15¢@2¢
 Brass Shot Shells, 1st quality..... 60¢@2¢
 Brass Shot Shells, Club, Rival, Climax..... 65¢@2¢

Shells, Loaded-

Standard List, July 19, 1890..... 40¢@10¢10¢5¢
 7¢ cash, 10 days.

Ship Tools-

L. & I. J. White..... 20¢@5¢

Shoes, Horse, Mule, & Horse-

Burden's, Perkins', Phoenix, Standard, Diamond State, Bryden's, Boss and Crescent, at factory..... \$4.00
 Bryden's Frog Pressure, at factory..... \$5.00

Mule-

Add \$1 keg to above prices.

Ox Wrought-

Ton lots..... \$10.00
 1000 lb lots..... \$10.00
 500 lb lots..... \$10.00

Shot-

Drop, up to B, 25-b bag..... \$1.40
 Drop, up to B, 5-b bag..... 35¢
 Drop, B and larger, 25-b bag..... 1.65
 Drop, B and larger, 5-b bag..... .40
 Buck and Oatmeal, 25-b bag..... 1.65
 Buck and Chilled, 5-b bag..... 4.00
 Dust Shot, 25-b bag..... 2.00
 Dust Shot, 5-b bag..... .45

Shovels and Spades-

Ames' Shovels, Spades, &c., list Nov. 1, 1888..... 20¢
 Note-Jobbers frequently give 5¢@7¢ extra on above.
 Griffith's Black Iron..... 50¢@10¢
 Griffith's C. S..... 60¢@60¢5¢
 Griffith's Solid C. S. R. R. Goods..... 20¢
 St. Louis Shovel Co..... 20¢@20¢7¢
 Hussey, Blans & Co..... 20¢@20¢7¢
 Hubbard & Co..... 20¢@20¢7¢
 Leigh Mfg. Co..... 60¢@10¢
 H. M. Myers Co..... 30¢
 Payne Pettibone & Son..... 33¢, 5¢
 Remington's (Lowman's Pat.) 40¢@10¢50¢
 Rowland's Black Iron..... 60¢@10¢50¢
 Rowland's Steel..... 60¢@60¢10¢
 Terra Haute Shovel &..... 25¢</

Whips

American Whip Co.: Length.	4 1/2	5	6	6 1/2	7	7 1/2	8 ft.
X. L. Whalebone Driving.....	\$18.00	\$20.00	\$22.00	\$24.00	\$27.00	\$30.00	\$33.00
Eureka, Two-thirds Whalebone.....	15.00	16.50	18.00	20.00			
Bull Bone, Half-length Whalebone.....			11.00	12.00	13.00	15.00	16.50
American Standard.....	8.00	8.50	9.00	10.00	12.00	13.50	15.00
True Grip, Raw Hide Center.....	6.00	6.00	6.50	7.00	7.50	8.00	
New Name, Stocked Java, Black and Wine Colors.....				6.00			
Americus, 93 Pen Whip.....				6.00			
Gents' Light Driving No. 111.....				6.00			
Gents' Light Driving No. 106.....				5.00			
Hand-made Stocked Java No. 108.....			3.75	4.00			
A large variety of cheaper grades.....							\$2.00 to \$3.00
Team Whips.....							\$2.00 to \$3.00
Toy Whips.....							\$2.00 to \$3.00
Hardware Assortment, 10/American, 75 Whips for \$50.00.							

Per dozen.

Ossawann Mills, Brass and Copper on Spools..... 50¢ to 10¢
 Taper's Spooled and Annealed..... 80¢ to 10¢
 Tate's Spooled Cop. and Brass..... 50¢
 Cast Steel Wire..... 50¢
 Stub's Steel Wire..... \$6.00 to 2, 30¢
 Steel Music Wire, 12 to 30, imported..... 60¢ to 70¢
 Wire Clothes Line, see Lines.
 Wire Picture Cord, see Cord.

Bright Wire Goods—
 Standard list..... 85¢ to 10¢ to 10¢
Wire Cloth and Netting—
 Painted Screen Cloth 100 ft..... \$1.50
 Galvanized Wire Netting..... 75¢ to 10¢ to 10¢

Wire Barb—
 See Trade Report.

Wire Rope—See Rope, Wire.
Wrenches—

American Adjustable..... 40¢
 Barker's Adjustable "S"..... 40¢ to 50¢
 Barter's Diagonal..... 60¢
 Coe's Genuine..... 50¢ to 10¢
 Coe's "Mechanics"..... 50¢ to 10¢
 Girard Standard..... 55¢ to 70¢
 Lamson & Sessions' Engineers'..... 60¢ to 10¢
 Lamson & Sessions' Standard..... 70¢ to 10¢
 P. S. & W. Agricultural..... 75¢ to 10¢ to 80¢
 Lamson & Sessions' Agric'l..... 75¢ to 10¢ to 80¢
 W. & B. Diamond..... 75¢ to 10¢ to 80¢

Bemis & Call's:
 Pat. Combination Bright..... 40¢ to 5¢
 Pat. Combination Black..... 40¢ to 10¢
 Merrick's Pattern..... 45¢
 Briggs' Pattern..... 30¢ to 10¢
 Cylinder or Gas Pipe..... 45¢ to 5¢
 No. 3 Pipe..... 55¢
 Aiken's Pocket (Bright)..... \$6.00, 50¢ to 10¢
 The Favorite Pocket..... \$4.00, 40¢
 Webster's Pat. Combination..... 25¢
 Boardman's..... 30¢
 Always Ready..... 25¢ to 5¢
 Alligator..... 50¢
 Donohue's Engineer..... 20¢ to 10¢
 Eagle..... 50¢ to 10¢
 Acme, Bright..... 50¢ to 2¢
 Acme, Nickel..... 40¢ to 2¢
 Hercules..... 70¢ to 5¢
 Walker's..... 55¢ to 3¢
 Diamond Steel..... 55¢ to 3¢
 Cincinnati Brace Wrenches..... 25¢ to 10¢
 Taft's Vise Wrench..... 55¢ to 10¢ to 3¢

Wringers, Clothes—

Am. Wringer Co.'s list, July 1, '93..... 2¢ cash
 Colby Wringer Co., list Sept. 1, '91..... 2¢ cash
 Lovell Mfg. Co., list July 1, 1892..... 2¢ cash
 Peerless Mfg. Co., list Feb., 1892..... 2¢ cash
 National Wringer & Mfg. Co., list June 1, 1892..... 2¢ cash

Wrought Goods—

Staples, Hooks, &c., list, March 17, 1892..... 85¢ to 10¢ to 85¢ to 1¢

Wire and Wire Goods—

Iron—

Market,

Br. & Ann., Nos. 0 to 18..... Extra 5¢ to 10¢
 Cop'd., Nos. 0 to 18..... 75¢ to 10¢ to 5¢
 Galv., Nos. 0 to 18..... 70¢ to 70¢ to 10¢
 Tin'd., Tin'd. list, Nos. 0 to 18..... 70¢ to 70¢ to 10¢

Stone, Br. & Ann'd., Nos. 16 to 18..... 80¢ Extra 10¢
 Nos. 19 to 26..... 80¢ to 5¢ often given.
 Nos. 27 to 36..... 82¢ to 5¢
 Tinned Broom Wire, 18 to 21, # 2..... 44¢
 Galvanized Fence..... 75¢ to 10¢
 Brass, list Jan. 18, 1884..... 40¢ to 5¢
 Copper, list Jan. 18, 1884..... 40¢ to 5¢
 Annealed Wire on Spools..... 60¢
 Barytes, Amer. No. 1..... 18.00
 Barytes, Amer. No. 2..... 13.00
 Barytes, Amer. No. 3..... 11.00
 Blue, Celestial..... 6¢
 Blue, Chinese..... 40¢
 Blue, Prussian..... 25¢
 Blue, Ultramarine..... 8¢
 Brown, Spanish..... 14¢
 Brown, Vandyke, Amer..... 3¢
 Brown, Vandyke, English..... 6¢
 Carmine, No. 40, in bulk..... 2.75¢
 Carmine, No. 40, in boxes or barrels..... 2.85¢
 Carmine, No. 40, in ounce bottles..... 3.75¢
 Chalk, in bulk..... 1.75¢
 Chalk, in bbls., # 100 m..... 33¢
 China Clay, English..... 13.00
 Cobalt Oxide, prep'd..... 9.00
 Cobalt Oxide, black..... 1.90¢
 Cobalt Oxide, black..... 1.90¢
 Green, Paris, in bulk..... 10¢
 Green, Paris, 170 to 175 m..... 10¢
 Green, Paris, small pack..... 12¢
 Green, Chrome, ordinary..... 22¢
 Lead, Eng., E.B. white..... 8 1/2¢
 Lead, Ann. White, dry or in oil..... 7¢
 Kegs, lots less than 500 m..... 6 1/2¢
 Kegs, lots 500 m to 5 tons..... 6 1/2¢
 Kegs, lots 5 tons to 12 tons..... 6 1/2¢
 Kegs, lots 12 tons and over..... 6 1/2¢
 Lead, White, in oil, 25 m tin pails, add to keg price..... 1¢
 Lead, White, in oil, 12 1/2 m tin pails, add to keg price..... 1¢
 Lead, White, in oil, 1 to 5 m as sorted tins, add to keg price..... 1¢
 Lead, Red, bbls. and 1/2 bbls..... 6 1/2¢
 Litharge, kegs..... 6 1/2¢
 Litharge, bbls. and 1/2 bbls..... 6¢

Paints, Oils and Colors.—Wholesale Prices.

Animal and Vegetable Oils—

Linseed, City, raw, per gal.....	47
Linseed, City, boiled.....	50
Linseed, Western, raw.....	47
Lard, City, Extra Winter.....	73
Lard, City, Prime.....	72
Lard, City, Extra No. 1.....	50
Lard, City, No. 1.....	45
Lard, Western, prime.....	72
Cotton-seed, Crude, prime.....	27
Cotton-seed, Crude, off grades.....	25
Cotton-seed, Summer Yellow, prime.....	33
Cotton-seed, Summer Yellow, off grades.....	30
Sperm, Crude.....	65
Sperm, Natural Spring.....	66
Sperm, Bleached Spring.....	71
Sperm, Natural Winter.....	71
Sperm, Bleached Winter.....	76
Whale, Crude.....	45
Whale, Natural Winter.....	45
Whale, Bleached Winter.....	48
Whale, Extra Bleached.....	50
Sea Elephant, Bleached Winter.....	35
Menhaden, Crude, Sound.....	35
Menhaden, Crude, Southern.....	39
Menhaden, Light Pressed.....	40
Menhaden, Bleached Water.....	48
Menhaden, Extra Bleached.....	55
Tallow, City, prime.....	50
Tallow, Western, prime.....	50
Cocanut, Ceylon.....	5 1/2¢
Cocanut, Cochiti.....	6 1/2¢
Cod, Domestic.....	38
Cod, Foreign.....	42
Red Elaine.....	44
Red Saponified.....	4 1/2¢
Bank.....	38
Straits.....	39
Olive, Italian, bbls.....	58
Neatsfoot, prime.....	50
Palm, prime, Lagos.....	7 1/2¢

Mineral Oils—

Black, 20 gravity, 25 to 30 cold test.....	7¢
Black, 20 gravity, 15 cold test.....	7 1/2¢
Black, 20 gravity, summer.....	7 1/2¢
Cylinder light, filtered.....	14¢

Cylinder, dark, filtered.....	10¢
Paraffine, 23 1/2 to 24 gravity.....	11¢
Paraffine, 25 gravity.....	10¢
Paraffine, 28 gravity.....	7 1/2¢
Paraffine, red.....	5 1/2¢

Paints and Colors—

Barytes, Foreign, 10 ton.....	\$22.00
Barytes, Amer. floated.....	\$20.00
Barytes, Amer. No. 1.....	18.00
Barytes, Amer. No. 2.....	13.00
Barytes, Amer. No. 3.....	11.00
Blue, Celestial.....	6¢
Blue, Chinese.....	40¢
Blue, Prussian.....	25¢
Blue, Ultramarine.....	8¢
Brown, Spanish.....	14¢
Brown, Vandyke, Amer.....	3¢
Brown, Vandyke, English.....	6¢
Carmine, No. 40, in bulk.....	2.75¢
Carmine, No. 40, in boxes or barrels.....	2.85¢
Carmine, No. 40, in ounce bottles.....	3.75¢
Chalk, in bulk.....	1.75¢
Chalk, in bbls., # 100 m.....	33¢
China Clay, English.....	13.00
Cobalt Oxide, prep'd.....	9.00
Cobalt Oxide, black.....	1.90¢
Cobalt Oxide, black.....	1.90¢
Green, Paris, in bulk.....	10¢
Green, Paris, 170 to 175 m.....	10¢
Green, Paris, small pack.....	12¢
Green, Chrome, ordinary.....	22¢
Lead, Eng., E.B. white.....	8 1/2¢
Lead, Ann. White, dry or in oil.....	7¢
Kegs, lots less than 500 m.....	6 1/2¢
Kegs, lots 500 m to 5 tons.....	6 1/2¢
Kegs, lots 5 tons to 12 tons.....	6 1/2¢
Kegs, lots 12 tons and over.....	6 1/2¢
Lead, White, in oil, 25 m tin pails, add to keg price.....	1¢
Lead, White, in oil, 12 1/2 m tin pails, add to keg price.....	1¢
Lead, White, in oil, 1 to 5 m as sorted tins, add to keg price.....	1¢
Lead, Red, bbls. and 1/2 bbls.....	6 1/2¢
Litharge, kegs.....	6 1/2¢
Litharge, bbls. and 1/2 bbls.....	6¢

TERMS, &c.—Lead and Litharge.—On lots of 500 m or over, 60 days' time or 2 1/2 % discount for cash if paid within 15 days of date of invoice.

Ocher, Rochelle.....	1.35
Ocher, French Washed.....	1 1/2¢
Ocher, German Washed.....	1 1/2¢
Ocher, American.....	1 1/2¢
Orange Mineral, English.....	8 1/2¢
Orange Mineral, French.....	10¢
Orange Mineral, German.....	8 1/2¢
Orange Mineral, American.....	8 1/2¢
Paris White, English Cliff.....	1.00
Paris White, American.....	65¢
Red, Indian, English.....	5 1/2¢
Red, Indian, American.....	2¢
Red, Turkey.....	9¢
Red, Tuscan.....	9¢
Red, Venetian, American.....	1.10
Red, Venetian, English.....	1.20
Sienna, Italian, Burnt and Powd.....	4¢
Sienna, Ital., Burnt Lumps.....	1 1/2¢
Sienna, Ital., Raw, Powd.....	4 1/2¢
Sienna, Ital., Raw, Lumps.....	1 1/2¢
Sienna, American, Raw.....	1 1/2¢
Sienna, American, Burnt and Powd.....	1 1/2¢
Talc, French.....	1 1/2¢
Talc, American.....	1 1/2¢
Terra Alba, Fr'ch, # 100 m.....	95¢
Terra Alba, English.....	70¢
Terra Alba, American No. 1.....	65¢
Terra Alba, American No. 2.....	45¢
Umber, Turkey, Burnt and Powd.....	3 1/2¢
Umber, Turkey Bnt. Ln.....	2 1/2¢
Umber, Turkey, Raw and Powd.....	3 1/2¢
Umber, Turkey, R'w Lumps.....	2 1/2¢
Umber, Turkey, Bnt. Amer.....	1 1/2¢
Yellow, Chrome.....	10¢
Vermilion, American Lead.....	11 1/2¢
Vermilion, Quicks'er, bulk.....	53¢
Vermilion, Quicks'er, bags.....	54¢
Vermilion, Quicksilver sm'r pks.....	62¢
Vermilion, English, Import.....	85¢
Vermilion, Imitation, Eng.....	8¢
Vermilion, Trieste.....	90¢
Vermilion, Chinese.....	82 1/2¢
Whiting Common, # 100 m.....	37 1/2¢
Whiting Gliders.....	45¢

Zinc, American, dry..... 3 1/2¢
 Zinc, French, Red Seal..... 7 1/2¢
 Zinc, French, Green Seal..... 9¢
 Zinc, French, V. M. X. O..... 7 1/2¢
 Zinc, Antwerp, Red Seal..... 7 1/2¢
 Zinc, Antwerp, Green Seal..... 7 1/2¢
 Zinc, German, L. Z. O..... 6 1/2¢
 Zinc, V. M. in Poppy Oil, G. Seal, lots of 1 ton and over..... 10 1/2¢
 Zinc, V. M. in Poppy Oil, Red Seal, lots less than 1 ton..... 10¢
 Zinc, V. M. in Poppy Oil, Red Seal, lots of 1 ton and over..... 10 1/2¢
 Discounts.—French Zinc.—Discounts to buyers of 10 bbl. lots of one or assorted grades, 1 1/2 to 25 bbls., 2 to 50 bbls., 4¢. No discount allowed on less than bbl. lots.

Colors in Oil—

Black, Drop, Frankfort.....	25
Black, Drop, English.....	12
Black, Drop, Domestic.....	7
Black, Lampblack, Best.....	20
Black, Lampblack, Common.....	7
Black, Ivory.....	8
Blue, Chinese.....	35
Blue, Prussian.....	20
Blue, Ultramarine.....	12
Brown, Vandyke.....	7
Green, Chrome.....	8
Green, Paris.....	16
Sienna, Raw.....	7
Sienna, Burnt.....	7
Umber, Raw.....	7
Umber, Burnt.....	7

Putty—

In barrels and 1/2 bbls.....	.013¢
In tubs.....	.015¢
In tin cans.....	.015¢
In bladders.....	.015¢

Spirits Turpentine—

In regular bbls.....	29¢
In machine bbls.....	29 1/2¢

Glue—

Low Grade.....	8¢
Cabinet.....	12¢
Medium White.....	13¢
Extra White.....	17¢
French.....	10¢
English.....	10¢
Irish.....	12¢

THE IRON AGE.

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